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(54) **PROGRAMMABLE CONTROL FOR SIREN AND LIGHTS**

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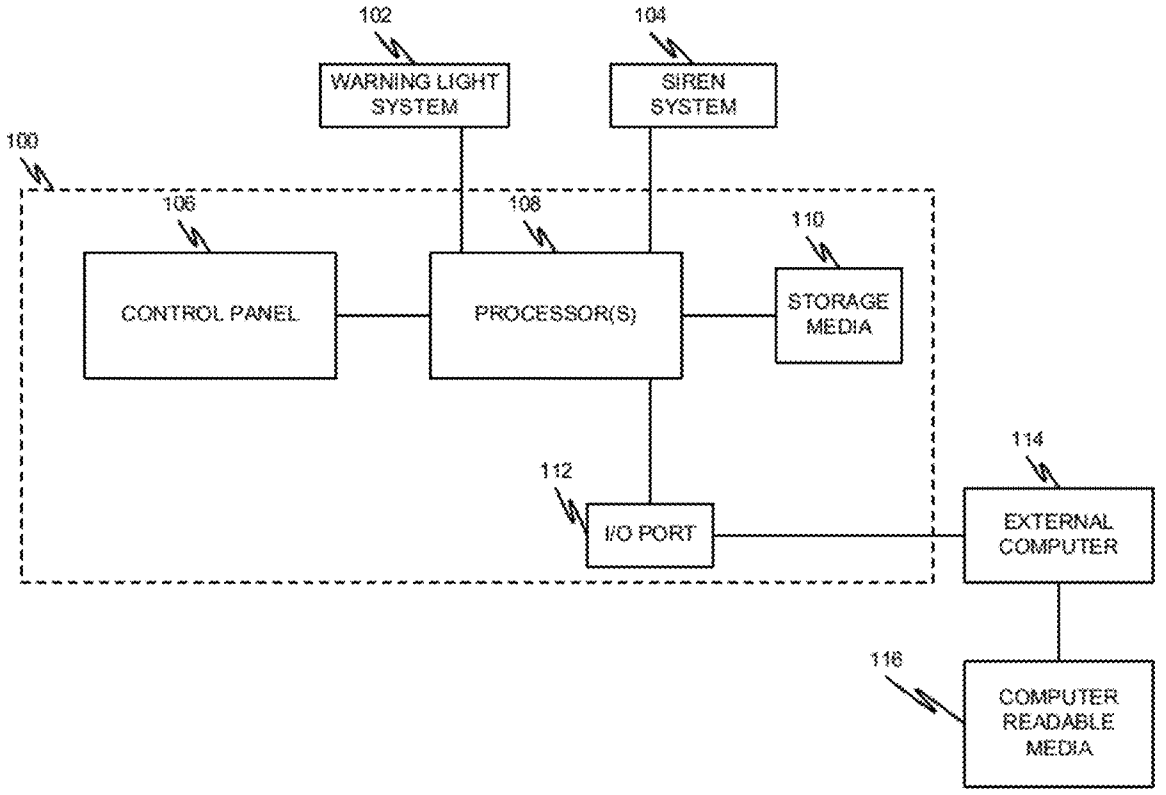
(57) **ABSTRACT**

A system comprising a power supply, an emergency warning light and a speaker, in combination with a control head. One or more processors controls operation of the system in response to received user input and provides system status for display. Storage media encoded with emergency warning light system instructions for execution by one or more of the processors controls the actuation of the emergency warning light system and controls light patterns generated by the emergency warning light system. The storage media is further encoded with siren system instructions for execution by one or more of the processors for controlling the actuation of the siren system and for controlling audible sounds generated by the siren system.



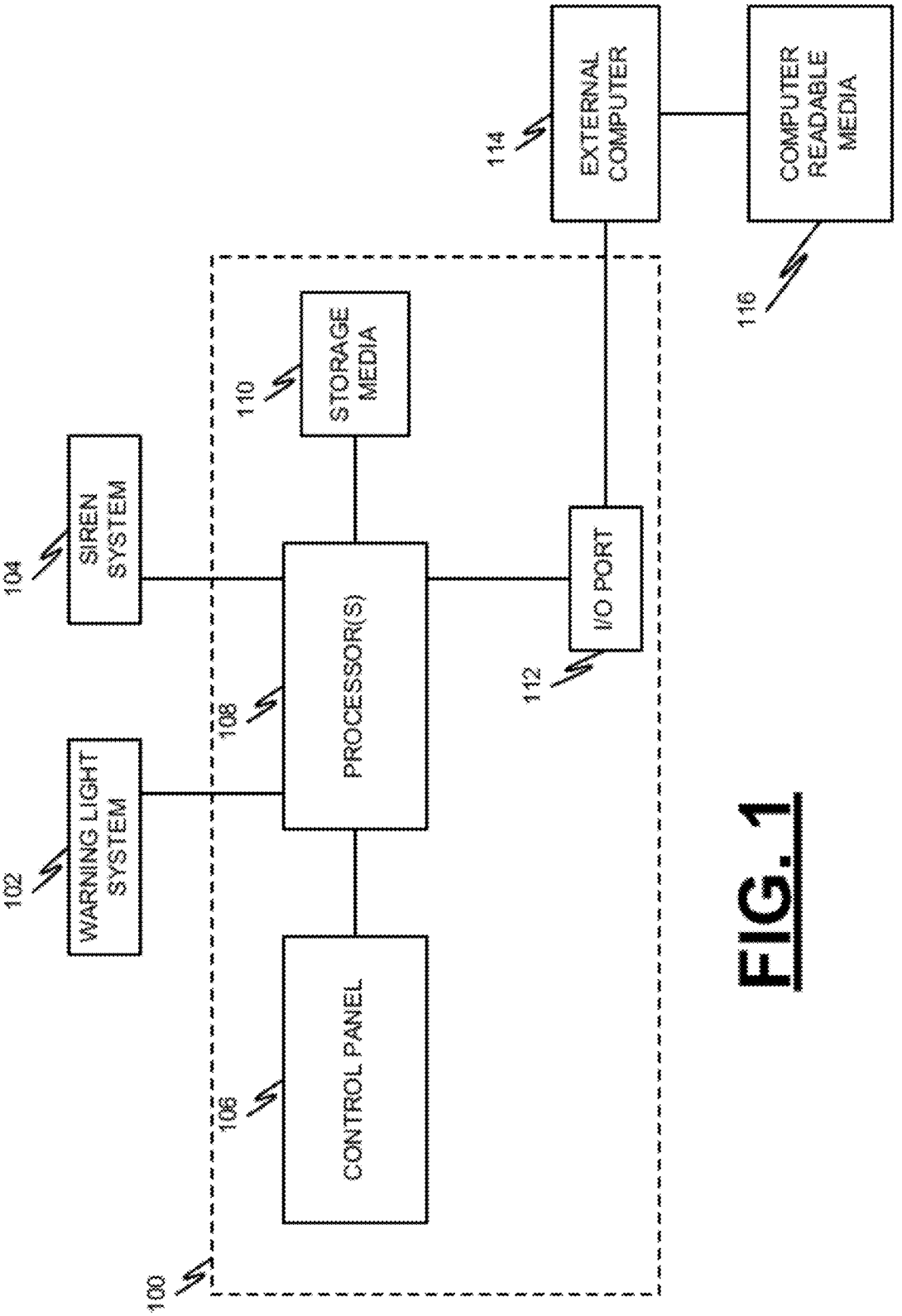

EXTERNAL COMPUTER
114
COMPUTER READABLE MEDIA
116
STORAGE MEDIA
110
SIREN SYSTEM
104
PROCESSOR(S)
108
I/O PORT
112
WARNING LIGHT SYSTEM
102
CONTROL PANEL
106
100

FIG. 1

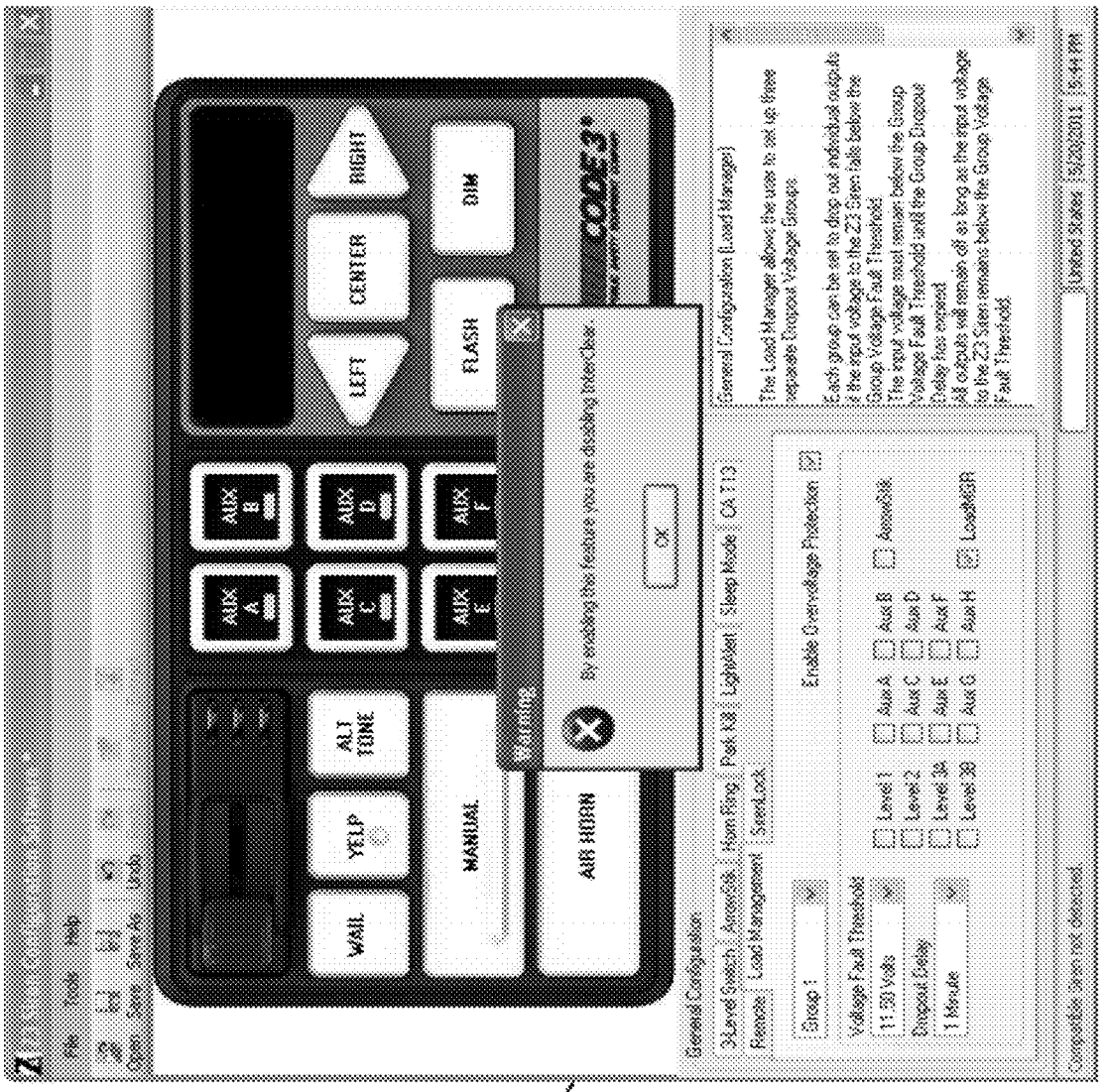
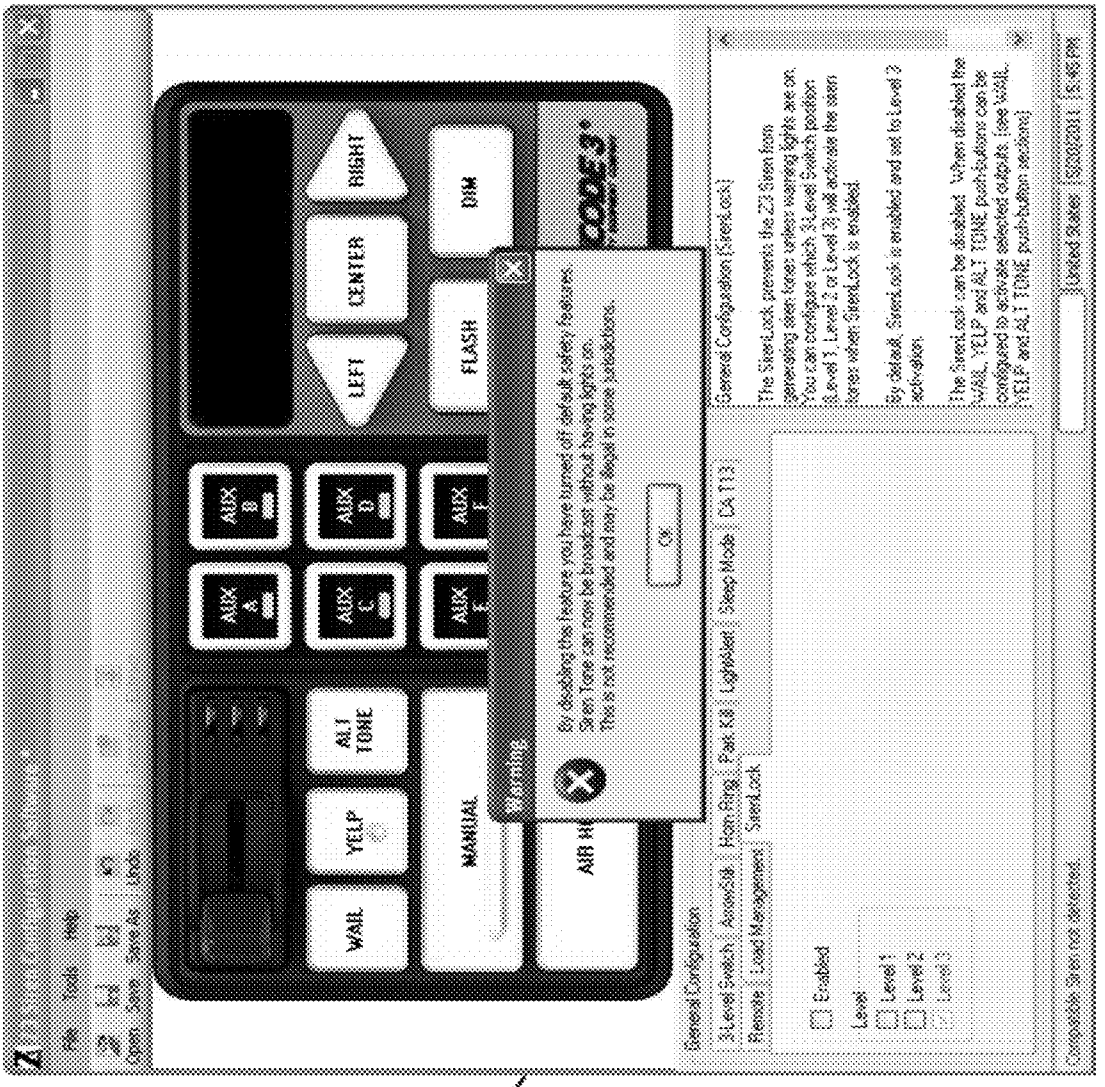
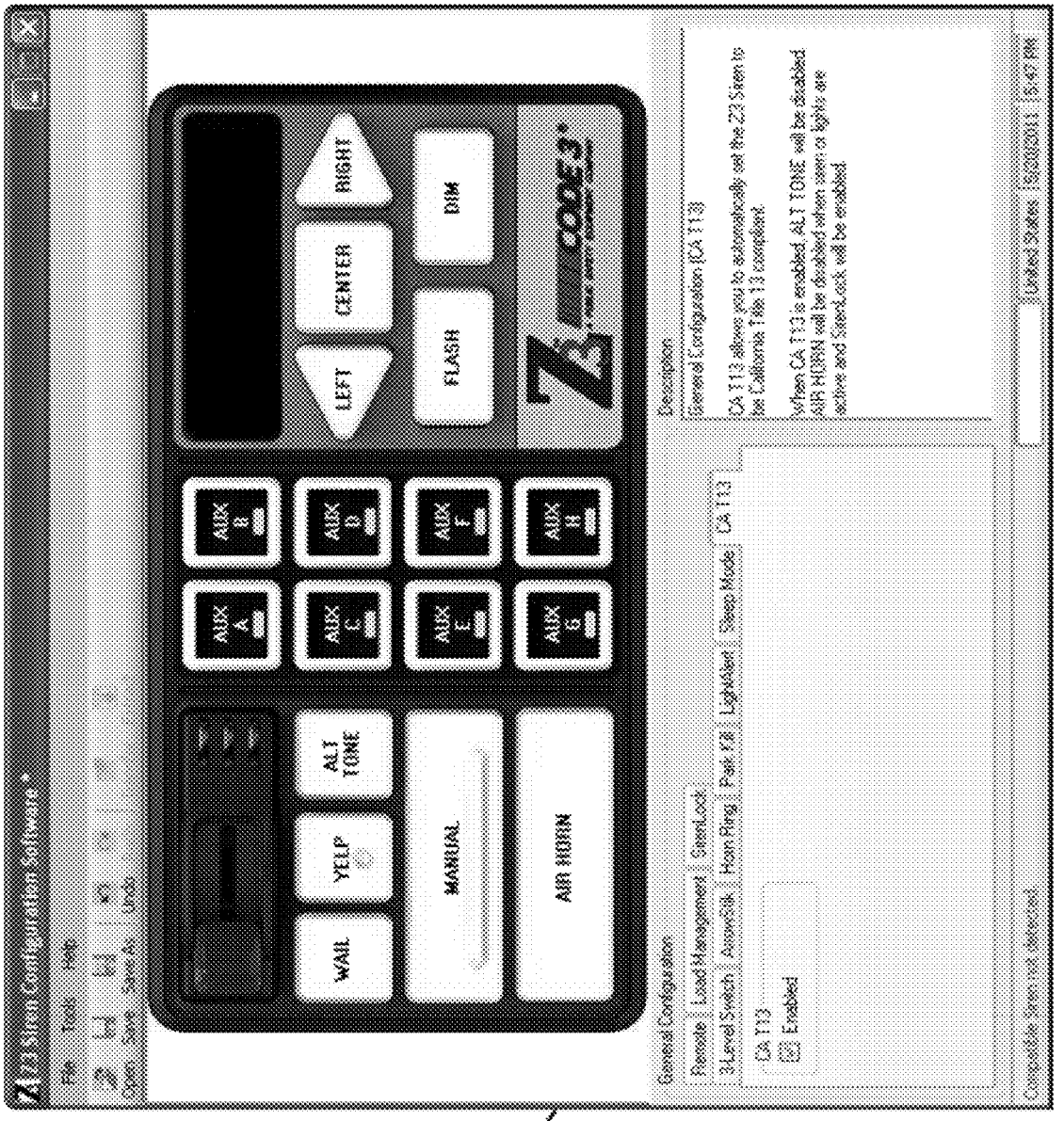

AUX A
AUX B
AUX C
AUX D
AUX E
AUX F
WAIL
YELP
ALT TONE
MANUAL
AIR HORN
LEFT
CENTER
RIGHT
FLASH
DIM
OK
120

FIG. 1A


WAIL
YELP
ALI TONE
MANUAL
AUX A
AUX B
AUX C
AUX D
AUX E
AUX F
LEFT
CENTER
RIGHT
FLASH
DIM
CODE 3
Warning
By disabling this feature you have turned off default safety features.
Siren Tone cannot be broadcast without having lights on.
This is not recommended and may be illegal in some jurisdictions.
Ok
General Configuration
3 Level Switch
Arrow Stik
Horn Ring
Pwr Kill
Lightsket
Sleep Mode
DA 113
Remote
Load Management
SirenLock
Enabled
Level
Level 1
Level 2
Level 3
General Configuration (SirenLock)
The SirenLock prevents the Z9 Siren from generating siren tones unless warning lights are on. You can configure which 3 Level Switch position (Level 1, Level 2 or Level 3) will activate the siren tones when SirenLock is enabled.
By default, SirenLock is enabled and set to Level 3 activation.
The SirenLock can be disabled. When disabled the WAIL, YELP and ALT TONE push-buttons can be configured to activate selected outputs. (see WAIL, YELP and ALT TONE push-button sections)
United States (5/20/2011 8:46 PM

140

FIG. 1B


AUX A
AUX B
AUX C
AUX D
AUX E
AUX F
AUX G
AUX H
WAIL
YELP
ALT TONE
MANUAL
AIR HORN
LEFT
CENTER
RIGHT
FLASH
DIM
Description
General Configuration (CA T13)
CA T13 allows you to automatically set the Z3 Siren to be California Title 13 compliant.
When CA T13 is enabled, ALT TONE will be disabled. AIR HORN will be disabled when siren or lights are active and SirenLock will be enabled.
General Configuration
Remote
Load Management
SirenLock
3-Level Switch
Arrow/Stik
Horn Ring
Park Kill
Lightsfeet
Sleep Mode
CA T13
CA T13
Enabled

160

FIG. 1C

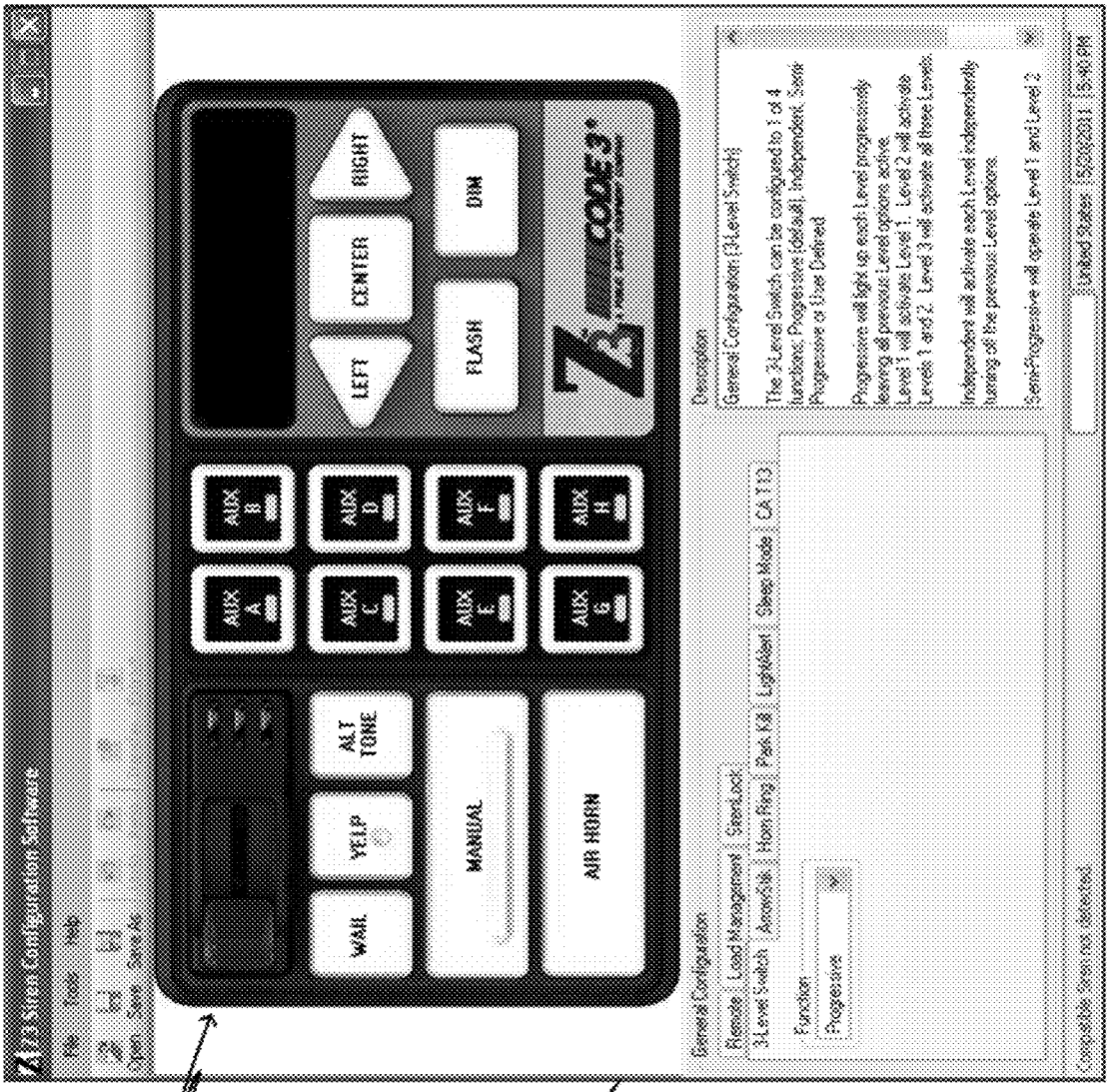
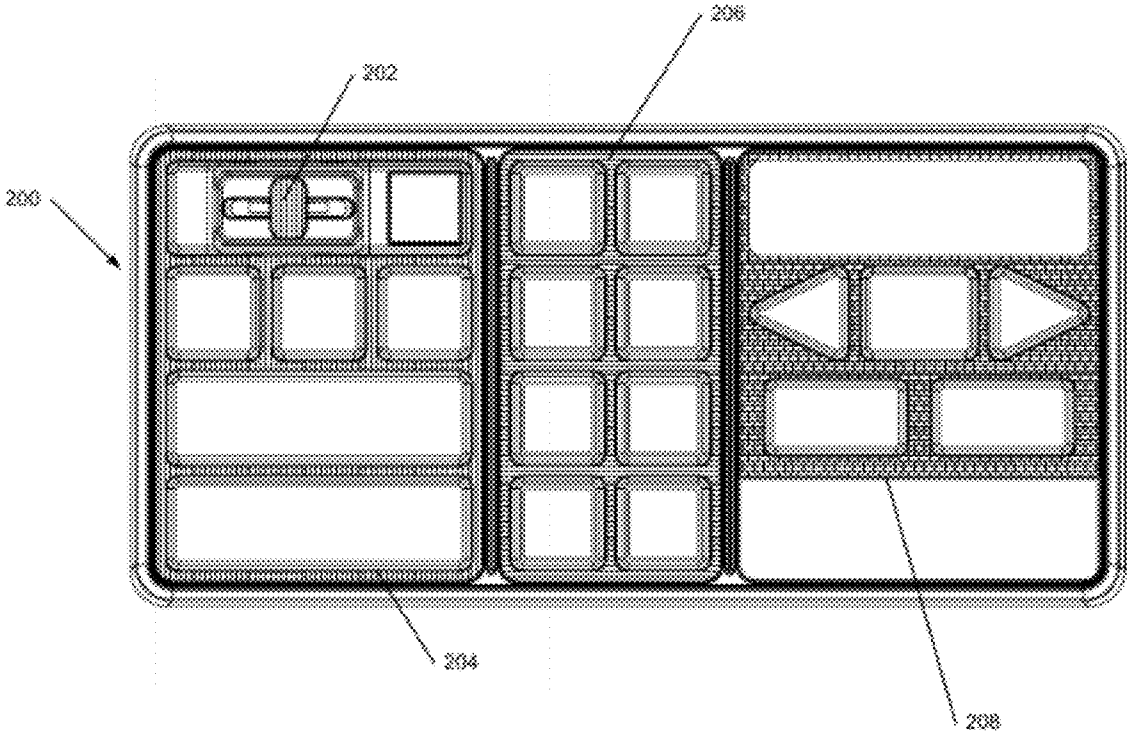

182
180
AUX A
AUX B
AUX C
AUX D
AUX E
AUX F
AUX G
AUX H
WAIL
YELP
ALT TONE
MANUAL
AIR HORN
LEFT
CENTER
RIGHT
FLASH
DIM
Description
General Configuration (3 Level Switch)
The 3 Level Switch can be configured to 1 of 4 functions; Progressive (default), Independent, Semi Progressive or User Defined
Progressive will light up each Level progressively leaving all previous Level options active. Level 1 will activate Level 1. Level 2 will activate Levels 1 and 2. Level 3 will activate all three Levels.
Independent will activate each Level independently having all the previous Level options.
Semi-Progressive will operate Level 1 and Level 2
General Configuration
Remote
Load Management
Sound out
3 Level Switch
Accessible
Horn Ring
Park Kill
Lightsbar
Siren Mode
CA T13
Function
Progressive
Compatible Siren not detected
Linked States
5/30/2011
5:40 PM

FIG. 1D

FIG. 2



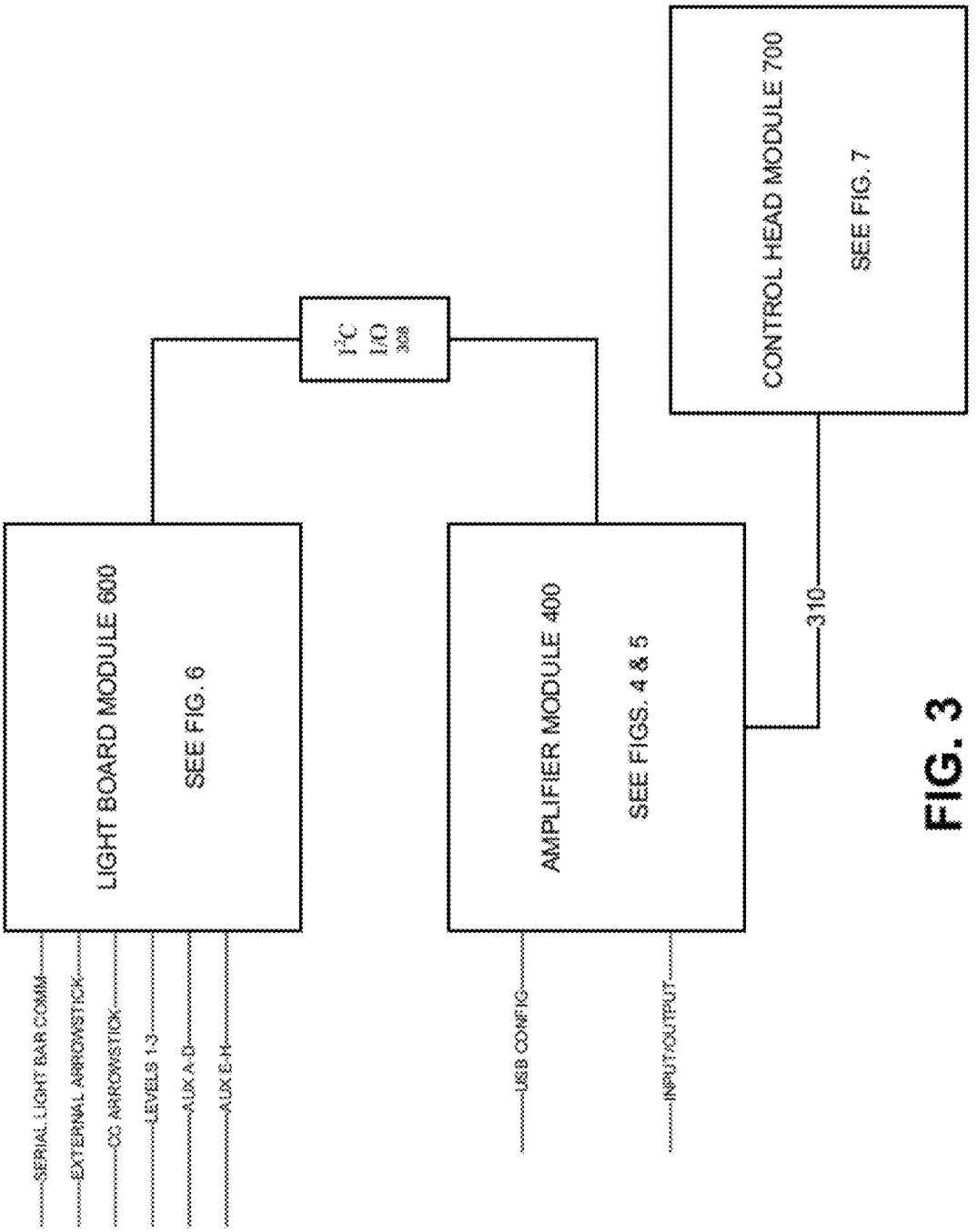

CONTROL HEAD MODULE 700
SEE FIG. 7
I²C LIO 308
LIGHT BOARD MODULE 600
SEE FIG. 6
AMPLIFIER MODULE 400
SEE FIGS. 4 & 5
310
SERIAL LIGHT BAR COMM
EXTERNAL ARROWSTICK
CC ARROWSTICK
LEVELS 1-3
AUX A-B
AUX E-H
LED CONFIG
INPUT/OUTPUT

FIG. 3

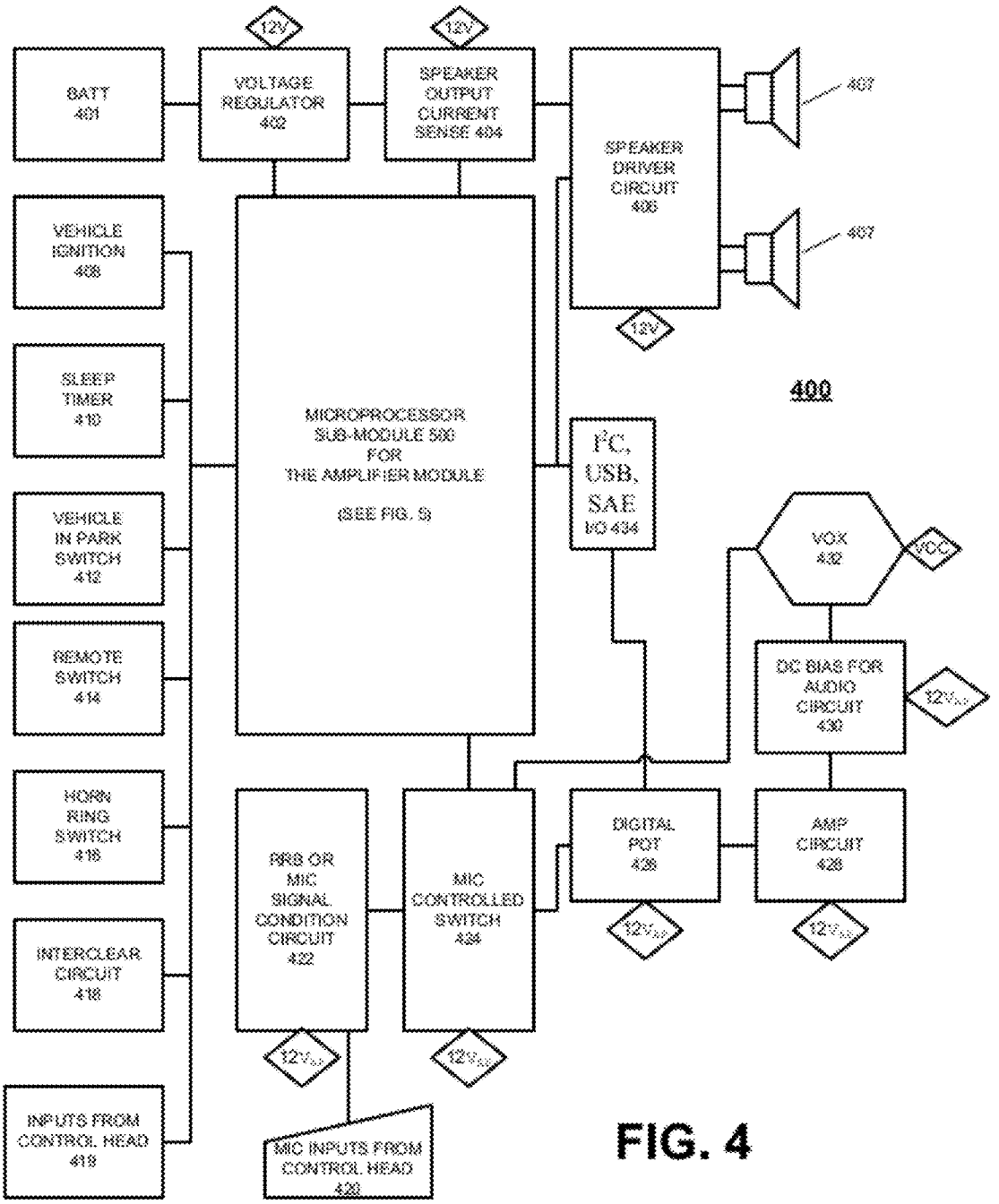

12V
12V
BATT
401
VOLTAGE
REGULATOR
402
SPEAKER
OUTPUT
CURRENT
SENSE 404
SPEAKER
DRIVER
CIRCUIT
406
407
407
12V
400
VEHICLE
IGNITION
408
SLEEP
TIMER
410
VEHICLE
IN PARK
SWITCH
412
REMOTE
SWITCH
414
HORN
RING
SWITCH
416
INTERCLEAR
CIRCUIT
418
INPUTS FROM
CONTROL HEAD
419
MICROPROCESSOR
SUB-MODULE 500
FOR
THE AMPLIFIER MODULE
(SEE FIG. 5)
I²C,
USB,
SAE
I/O 434
VOX
432
VCC
DC BIAS FOR
AUDIO
CIRCUIT
430
12V
RRB OR
MIC
SIGNAL
CONDITION
CIRCUIT
422
MIC
CONTROLLED
SWITCH
424
DIGITAL
POT
428
AMP
CIRCUIT
426
12V
12V
12V
12V
MIC INPUTS FROM
CONTROL HEAD
420

FIG. 4

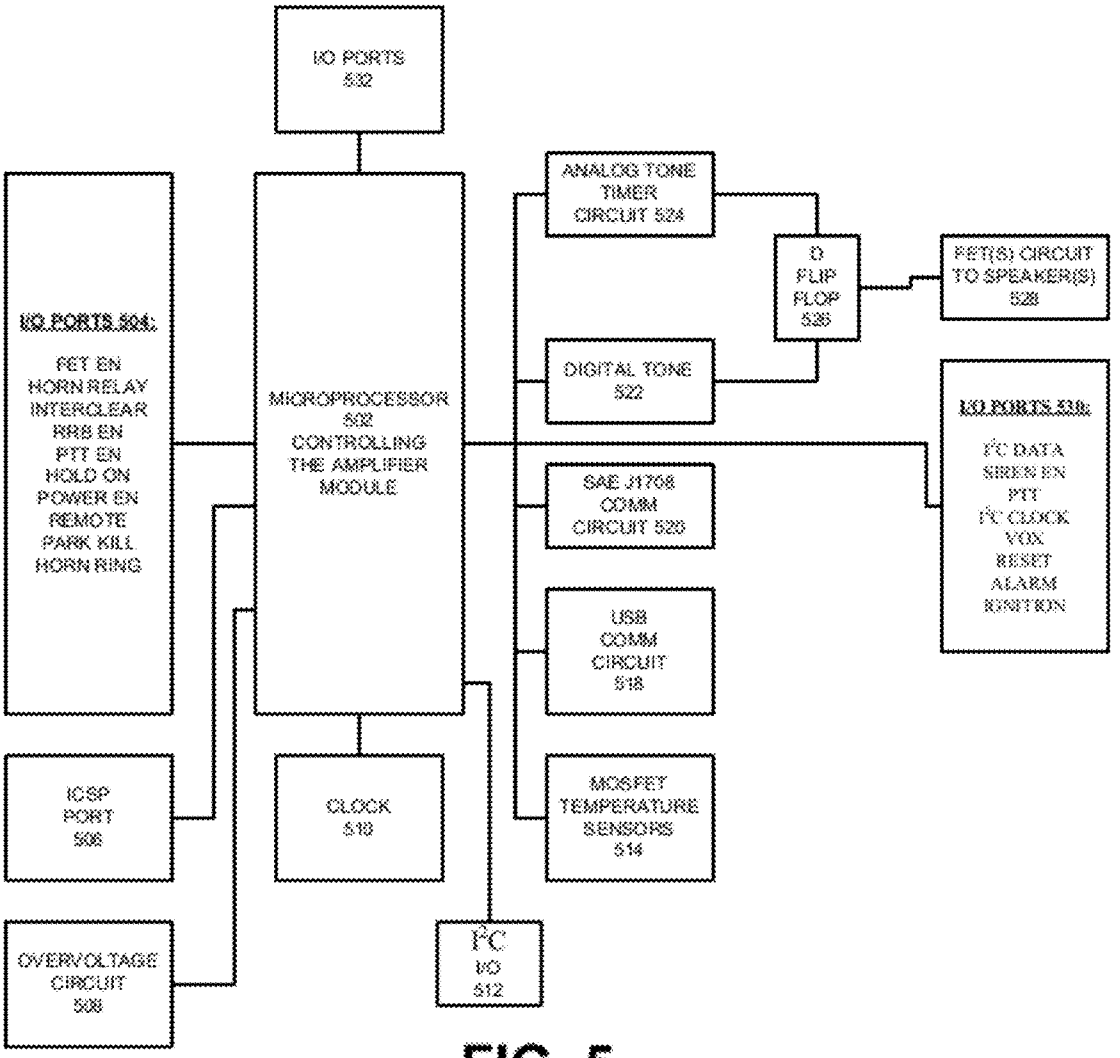

I/O PORTS
532
I/O PORTS 504:
FET EN
HORN RELAY
INTERCLEAR
RRS EN
PTT EN
HOLD ON
POWER EN
REMOTE
PARK KILL
HORN RING
MICROPROCESSOR
502
CONTROLLING
THE AMPLIFIER
MODULE
ANALOG TONE
TIMER
CIRCUIT 524
D
FLIP
FLOP
526
FET(S) CIRCUIT
TO SPEAKER(S)
528
DIGITAL TONE
522
I/O PORTS 530:
I²C DATA
SIREN EN
PTT
I²C CLOCK
VOX
RESET
ALARM
IGNITION
SAE J1708
COMM
CIRCUIT 520
USB
COMM
CIRCUIT
518
ICSP
PORT
508
CLOCK
510
MOSFET
TEMPERATURE
SENSORS
514
OVERVOLTAGE
CIRCUIT
506
I²C
I/O
512

FIG. 5

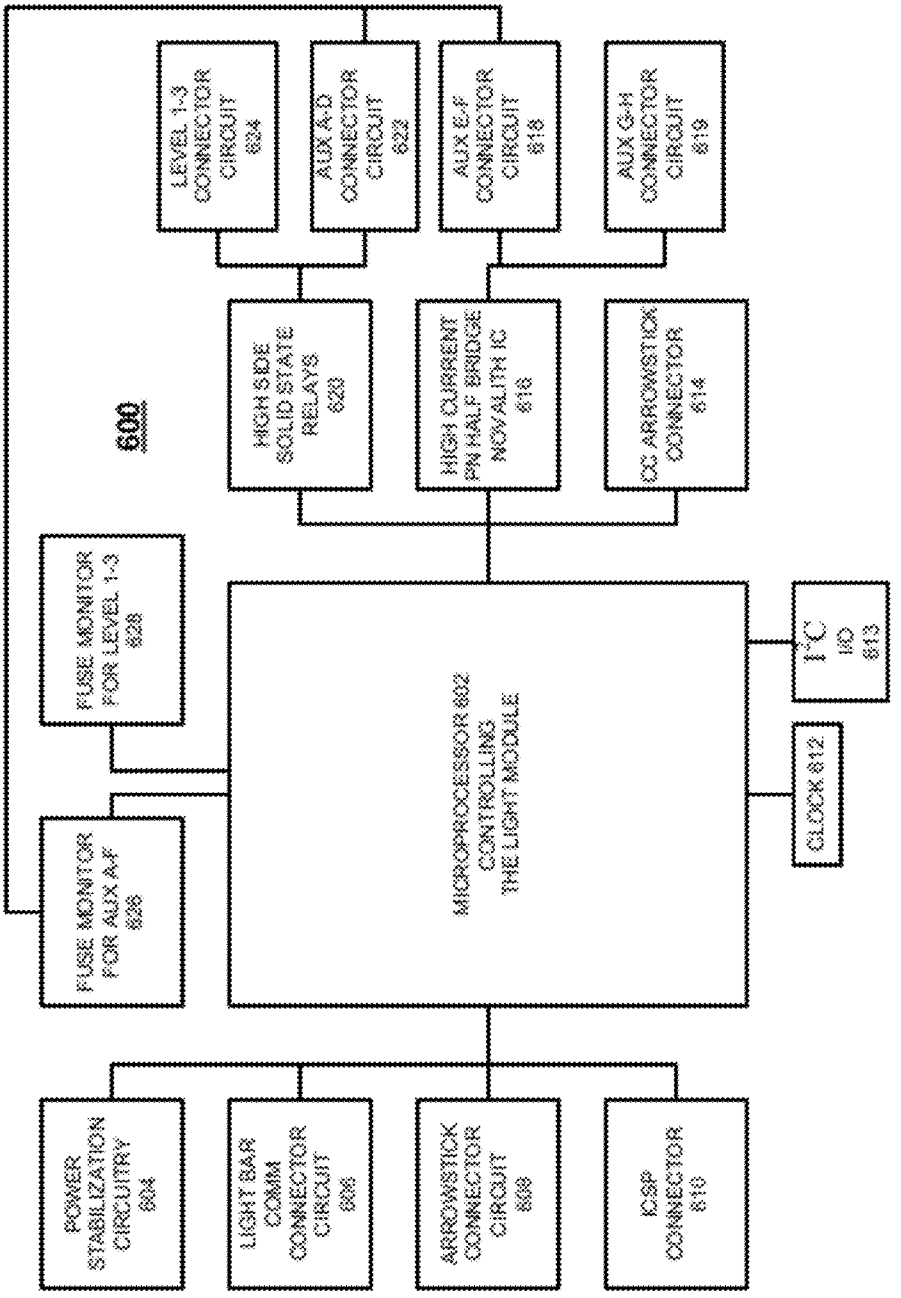

600
LEVEL 1-3 CONNECTOR CIRCUIT 624
AUX A-D CONNECTOR CIRCUIT 622
AUX E-F CONNECTOR CIRCUIT 618
AUX G-H CONNECTOR CIRCUIT 619
HIGH SIDE SOLID STATE RELAYS 620
HIGH CURRENT PIN HALF BRIDGE NOVALITH IC 616
CC ARROWSTICK CONNECTOR 614
FUSE MONITOR FOR LEVEL 1-3 628
FUSE MONITOR FOR AUX A-F 626
MICROPROCESSOR 602 CONTROLLING THE LIGHT MODULE
I²C I/O 613
CLOCK 612
POWER STABILIZATION CIRCUITRY 604
LIGHT BAR COMM CONNECTOR CIRCUIT 606
ARROWSTICK CONNECTOR CIRCUIT 608
ICSP CONNECTOR 610

FIG. 6

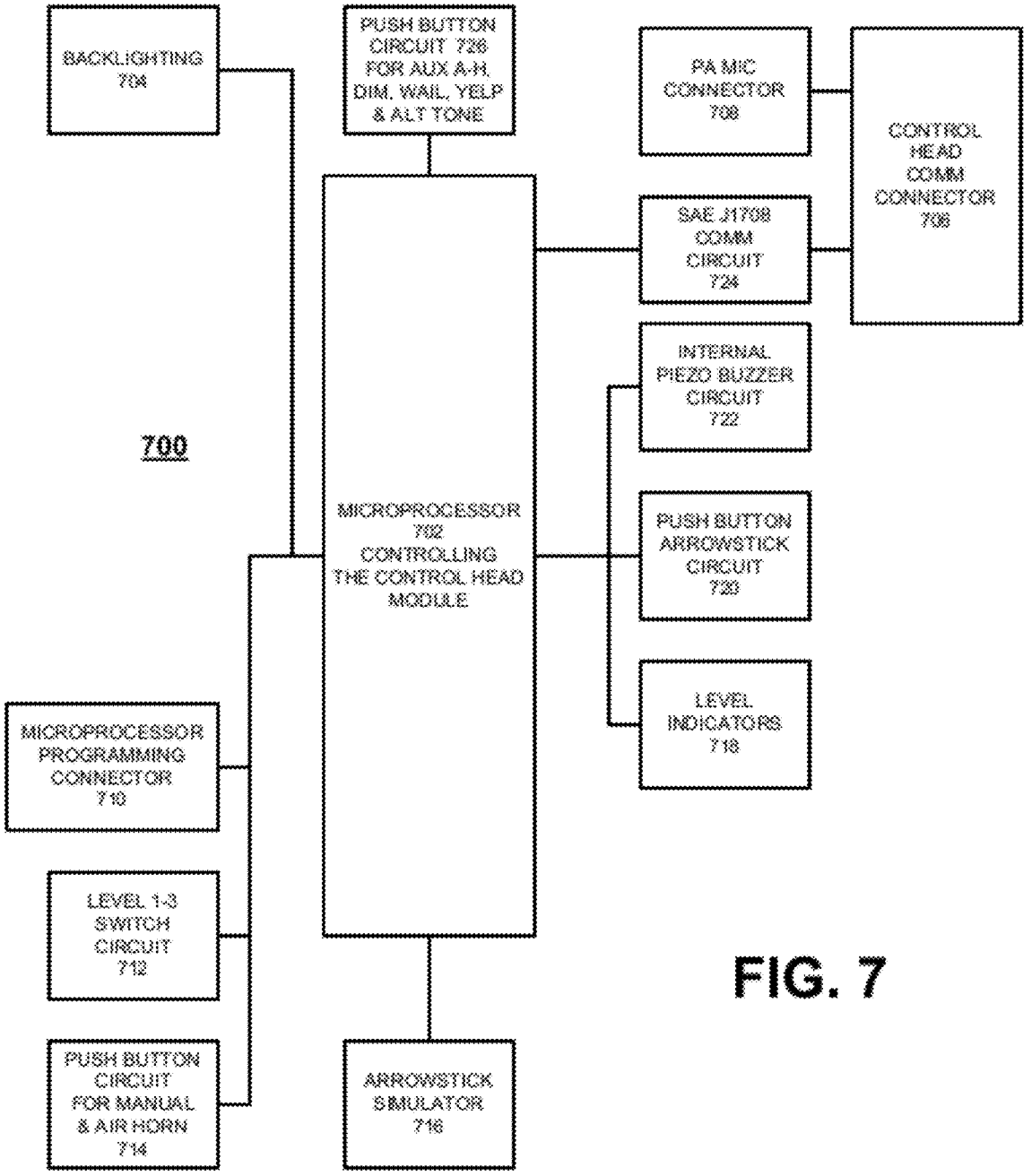

700
BACKLIGHTING 704
PUSH BUTTON CIRCUIT 726 FOR AUX A-H, DIM, WAIL, YELP & ALT TONE
PA MIC CONNECTOR 708
CONTROL HEAD COMM CONNECTOR 706
SAE J1708 COMM CIRCUIT 724
INTERNAL PIEZO BUZZER CIRCUIT 722
MICROPROCESSOR 702 CONTROLLING THE CONTROL HEAD MODULE
PUSH BUTTON ARROWSTICK CIRCUIT 720
LEVEL INDICATORS 718
MICROPROCESSOR PROGRAMMING CONNECTOR 710
LEVEL 1-3 SWITCH CIRCUIT 712
PUSH BUTTON CIRCUIT FOR MANUAL & AIR HORN 714
ARROWSTICK SIMULATOR 716

FIG. 7

PROGRAMMABLE CONTROL FOR SIREN AND LIGHTS

BACKGROUND

[0001] The technology described in this patent document generally relates to a system for controlling sirens and warning lights in a motorized vehicle and, in particular, to a programmable control system for a siren and warning lights in a motorized vehicle.

SUMMARY

[0002] Systems and methods are described herein for controlling a siren and warning light, system in a motorized vehicle. In one example, a system is provided for use with a power supply of a vehicle, an emergency warning light and a speaker. The system includes an amplifier module, a light module and a control module. The amplifier module has an input, receiving power from the power supply and has outputs for selectively energizing the emergency warning light and for selectively energizing the speaker. The amplifier module has an amplifier module processor controlling the outputs of amplifier module. The amplifier module processor has a communications port. The light module has an input receiving power from the power supply and has outputs for controlling the emergency warning light. The light module has a light module processor communicating the amplifier module and controlling the outputs of the light module. The light module processor has a communications port. A communications link connects the amplifier module communications port to the light module communications port. The control head connected to the amplifier module processor controls the amplifier module and controls the light module processor via the amplifier module processor and via the communications link.

[0003] In another example, a method is provided for use with a power supply, an emergency warning light and a speaker. The example method comprises:

[0004] providing an amplifier module having an input receiving power from the power supply and having outputs for selectively energizing the emergency warning light and for selectively energizing the speaker, the amplifier module having an amplifier module processor controlling the outputs of amplifier module, the amplifier module processor having a communications port;

[0005] providing a light module having an input receiving power from the power supply and having outputs for controlling the emergency warning light, the light module having a light module processor communicating with the amplifier module and controlling the outputs of the light module, the light module processor having a communications port;

[0006] providing a communications link connecting the amplifier module communications port to the light module communications port; and

[0007] controlling the amplifier module and controlling the light module processor via the amplifier module processor and via the communications link.

[0008] In another example, provided is a system for controlling the use of an emergency warning light system and for controlling the use of a siren system in a motorized vehicle. A user control panel receives user input and displays system status. One or more processors control operation of the system in response to received user input and provide system status for display. Storage media encoded with emergency warning light system instructions for execution by one or more of the processors controls the actuation of the emergency warning light system and controls light patterns generated by the emergency warning light system. The storage media further encoded with siren system instructions for execution by one or more of the processors controls the actuation of the siren system and controls audible sounds generated by the siren system.

[0009] In another example, a system is provided for controlling the use of an emergency warning light and for controlling the use of a siren in a motorized vehicle. A user control panel receives user input and displays system status. One or more processors controls operation of the system in response to received user input and provides system status for display. Storage media encoded with system instructions for execution by one or more of the processors controls the actuation of and the pattern provided through the emergency warning light and controls the actuation of and the audible sounds generated by the siren. Alternatively or in addition, the system may have one or more of the following:

[0010] wherein when a push-to-talk (PTT) function is activated for providing audio via a speaker, one or more of the processors resets the PTT function after a preset period of being activated so that the reset returns the system to its previous condition even though the PTT function continues to be active thereby avoiding a system operation in which the PTT function is activated beyond the preset period;

[0011] one or more of the processors is programmed to implement a configurable power manager function or a configurable load, manager function;

[0012] one or more of the processors is programmed to implement monitoring voltages or currents of components and includes de-energizing a component having a monitored voltage or a monitored current outside a preset range;

[0013] one or more of the processors as programmed to implement monitoring current or voltage of the power supply and includes dropout voltage groups wherein a user selects one or more groups of outputs of the system to de-energize when the power supply levels fail below a specified voltage level for each selected group; and/or

[0014] wherein one or more of the processors implements a load manager function and a configurable delayed shutoff function wherein the load manager when configured controls the power to other equipment in the vehicle through an external solenoid and wherein the configurable delayed shutoff function when configured includes a sleep delay timer such that the system remains active after the vehicle ignition is turned off for the duration of the sleep delay timer.

BRIEF DESCRIPTION OF THE DRAWINGS AND APPENDICES

[0015] FIG. **1** is a block diagram of another example system for controlling the actuation of a warning light system and siren in a motorized vehicle.

[0016] FIGS. **1**A-**1**D are example screen shots of the control panel for configuring an example amplifier module.

[0017] FIG. **2** is an illustration of the display of an example control head, lined for color. The toggle switch and the left section of the faceplate of the control head are lined for the color red, the center section of the faceplate of the control

head is lined for blue, and the upper right section of the faceplate of the control head is lined, for yellow (e.g., amber).

[0018] FIG. **3** is a block diagram of an example system for controlling warning lights and a siren.

[0019] FIG. **4** is a block diagram of an example amplifier module.

[0020] FIG. **5** is a block diagram of an example microprocessor sub-module for the example amplifier module.

[0021] FIG. **6** is a block diagram of an example light module.

[0022] FIG. **7** is a block diagram of an example control head module.

[0023] APPENDIX 1 illustrates FUNCTIONS CONTROLLED BY AMPLIFIER MODULE processor of an example system.

[0024] APPENDIX 2 illustrates FUNCTIONS CONTROLLED BY CONTROL HEAD MODULE PROCESSOR of an example system.

[0025] APPENDIX 3 illustrates FUNCTIONS CONTROLLED BY LIGHT MODULE PROCESSOR of an example system.

[0026] APPENDIX 4 illustrates Siren System Platform Z3™ Siren System Technical Specification of an example system.

[0027] APPENDIX 5 illustrates a Hardware Installation and Operation Manual of an example system.

[0028] APPENDIX 6 illustrates a Hardware Quick Install Manual of an example system.

[0029] APPENDIX 7 illustrates a Quick Start Software Configuration Setup Manual of an example system.

[0030] APPENDIX 8 illustrates a Software User Manual of an example system.

[0031] Corresponding reference characters indicate corresponding parts throughout the drawings.

DETAILED DESCRIPTION

[0032] FIGS. **1A-1D** are example screen shots of displays presented by software for configuring an amplifier module. Many parameters of the example system may be specified by the user, some of which have limited ranges, minimums and/or maximums. Example settings and their purpose are discussed below and within the Appendices.

[0033] FIG. **1** is a block diagram of an example system **100** for controlling the actuation of a warning light system **102** and siren system **104** in a motorized vehicle such as an emergency vehicle. The example system **100** includes a control panel **106**, one or more processors **103**, storage media **110**, and an input/output (I/O) port **112**, such as a USB or other port. The control panel **106** may be used to receive user input, for example is push buttons, switches, touchpad, etc., and may be used to display system status.

[0034] The processor(s) **103** execute programming instructions stored on storage media **110** to control the operation of the system, such as the actuation of the warning light system and the light patters generated by the warning light system, in response to received user input and to provide system status for display by the control panel **106**. The processor(s) **108** also execute other programming instructions stored on storage media **110** to control other operations of the system, such as executing programming instructions for controlling the actuation of the siren system and for controlling audible sounds generated by the siren system.

[0035] The I/O port **112** may be used by an external computer **114** to pass instructions or data to the processor (s) **108** and/or storage media **110** that may be stored in the storage media **110**. Data and/or instructions passed by the external computer **114** may be used by the processor (s) **108** to configure the system **100**. The instructions may include monitoring instructions for detecting a system setting which is outside a reference range, above a maximum and/or below a minimum. Among other features, the monitoring instructions may control the system and/or provide a warning to the user when a system setting is outside the reference range. For example, FIG. **1A** illustrates a screen **120** which allows a user to select the load management settings, such as under-voltage and over-voltage thresholds, among other setting discussed herein. FIG. **1B** illustrates a screen **140** which allows a user to select the siren lock settings, among other setting discussed herein. FIG. **1C** illustrates a screen **160** which allows a user so select the California Title 13 settings (CA T 13), among other setting discussed herein. FIG. **15** illustrates a screen **180** which allows a user to select function settings for a 3-level toggle switch **182** (see also **202** of FIG. **2**), among other setting discussed herein.

[0036] The storage media **110** may also be encoded with operating options instructions that when executed by one or more of the processors **108** causes the system **100** to receive operating options data over the I/O port **112**. The operating options data, when interpreted by one of the processors **108** executing the operating options instructions, causes the system to make available for user selection via the user control panel **106** (e.g., a control head module **700**) a subset of available system operating options. The subset of system operating options corresponds to the operating options data.

[0037] Tangible computer readable media **116** encoded with computer executable user-configurable instructions may also be provided for use with the external computer. The user-configurable instructions when executed by the external computer **114** may allow the external computer to provide monitoring instructions to the processor (s) via the I/O port **112**. The monitoring instructions may cause the system **100** to monitor a system setting, to detect when the system setting is outside a reference range and/or to provide a warning indication via the user control panel **106** when the system setting is outside the reference range.

[0038] The storage media **110** may also be encoded with load management instructions. When the load management instructions are executed by the processor(s), the system **100** monitors system input voltage from a vehicle battery, detects when the system input voltage is outside a system input voltage reference range and/or provides a warning indication via the user control panel **106** when the system input voltage is outside the system input voltage reference range.

[0039] FIG. **2** is an example control head **200**, lined for color. In this example, a toggle switch **202** and a left section **204** of a faceplate of the control head **200** are red to indicate to the user that the control buttons and toggle switch located in the left portion of the control head control a siren. The left section **202** is lined for the color red. A center section **206** of the faceplate of the control head **200** is blue to indicate to the user that the control buttons located in the center section **206** of the control head control the auxiliary buttons which control a light bar and/or other devices on the vehicle. The center section **206** is lined for the color blue. A right section **203** of the faceplate of the control head **200** is lined for amber (e.g., yellow) to indicate to the user that the control buttons located in the right portion of the control head control the traffic directing equipment. The right section **208** is lined for the

color amber (yellow). A backlight control button for controlling dimming of a backlight for the control head **200** may also be positioned with the right section **208**. It activates the DIM output on the control head. This DIM output would be connected to the light source for the control head, or other lighting equipment that has a DIM input control. This allows the user to place the backlighting of the control head **200** and/or other lighting equipment into a DIM mode of operation.

[0040] Thus, the example control head includes three control groups presented to an operator: a first control group for selectively controlling siren operation, a second control group for selectively controlling auxiliary operations, such as the emergency warning lights of a vehicle, and a third control group for selectively controlling a traffic directing light and/or emergency warning lights. The first control group includes the red toggle switch **202** and other switches having the faceplate **204** colored red. The second control group includes the switches having the faceplate **206** colored blue. The third control group has switches having the faceplate **208** colored amber (yellow).

[0041] FIG. **3** is a block diagram of another example system for controlling the actuation of a warning light system and siren system in a motorized vehicle such as an emergency vehicle. In general, FIG. **3** illustrates the primary connections between the modules of the example system: an amplifier module **400** primarily for driving siren speakers, a light board module **600** for primarily driving an emergency warning light or an auxiliary device and a control head module **700** for controlling the operation of the siren and other connected devices (e.g., via a CAT 5 cable **306**). Both the amplifier module **400** and light bar module **600** receive power via cable connections to a battery (not shown), such as a vehicle battery. The light bar module **600** may have a dual cable connection to the battery so that three higher gauge cables instead of two lower gauge cables can handle the current needs for driving the light bar. An internal communication cable **308** interconnects processors of the modules **400**, **600** to facilitate an I^2C I/O (input/output) communication link between the modules **400**, **600** and to facilitate communication with the control head module, which may connected to the amplifier processor **400** via a CAT-5 SAE J1708 communications cable **310**.

[0042] Alternatively or in addition, some or all of the communication link between components may be direct wired or wireless, such as Wi-Fi. In one example, each module has a processor. In another example, a single processor may be used so that a communication link between the modules and/or processors is not needed. In yet another example, one or more processors control operation of the system in response to received user input and provide system status for display. The processors may be independent of each other so that a communications link between processors is not needed. In general, a link or cable **308** between storage media encoded with system instructions for execution by one or more of the processors controls the actuation of and the pattern provided through the emergency warning light and controls the actuation of and the audible sounds generated by the siren. For convenience, the following description of FIGS. **4-7** includes the example wherein each module has a processor. The examples shown in FIGS. **4-7** may be modified to include one or more processors. Also, FIGS. **4-7** show one example implementation of the various functions, inputs and outputs of the modules and the processors. Other example implementations may provide for any one or more of the processors to provide any one or more of the functions illustrated and any one or more of the processors may have any one or more of the inputs and/or outputs instead of or in addition to the other processors. Also, the example system of FIG. **1** may perform any one or more of the functions illustrated with regard to FIGS. **4-7** and may have any one or more of the inputs and/or outputs illustrated in FIGS. **4-7**.

[0043] FIG. **4** is a block diagram of some of the various inputs and outputs of an example amplifier module **400**. The module **400** is connected to a vehicle battery **401** for other battery) via a voltage regulator **402** and also via a circuit **404** for sensing current (and/or voltage) supplied by the battery **401** to a speaker driver circuit **406** driving one or more speakers **407**. An ignition input port **408** monitors the on/off condition of the vehicle ignition. A software timer **410** in the amplifier processor (see **502** in FIG. **5**) is referred to as a sleep timer. This sleep timer may be configured using the siren configuration software. In one example, it may be set for instant off or for a 10 minute, 20 minute, 30 minute, one hour, two hour, or four hour delay. This delay is started when the processor **502** detects that the vehicle ignition is turned off through the ignition input **408**. The sleep timer maintains power to the amplifier, the control head and the light board until the delay expires.

[0044] A park switch input **412** monitors the status of the vehicle park switch. An additional remote switch I/O port **414** may be to connect to an independent control switch such as a foot switch (not shown). The amplifier module **400** is programmed to execute a particular mode when receiving the appropriate signal via the remote switch input port **414**. For example, when the foot switch is activated while the amplifier is generating one of the primary tones, the amplifier would execute a particular mode, such as change the amplifier tone from the primary tone to an override tone for approximately 7 to 8 seconds. It may also activate an InterClear output based on the configuration settings. As used herein, Interclear is a user-actuated timed-circuit option that initially changes the tones of the siren and the pattern of the light signals as the vehicle approaches an intersection, and then returns the siren to normal operation after a pre-set interval.

[0045] A horn ring I/O **416** monitors the status of a horn ring switch (not shown). The amplifier module **400** is programmed to execute a particular mode when receiving the appropriate signal via the horn ring I/O **416**. For example, when the horn ring is activated while the amplifier is generating one of the primary tones, the amplifier would execute a particular mode, such as change the amplifier tone from the primary tone to an override tone for approximately 7 to 8 seconds. It may also activate the InterClear output based on the configuration settings. An InterClear output **418** connects to an InterClear circuit which connects to the device or circuit that activate an InterClear Feature. The operation during the InterClear mode is preprogrammed by the user. InterClear may be activated in different ways. For example, if the siren is operating one of the three primary tones (wail, yelp, alt tone) and the horn ring is configured for Hit-n-Go, the InterClear feature turns on when the vehicle horn ring is pressed and remains on for approximately 7 to 8 seconds. The siren also generates one of the secondary tones as configured. In one embodiment, a manual button can also turn on the InterClear output while it is pressed. The InterClear output can also be configured to operate as the LoadMGR output. This feature disables the normal InterClear function and utilizes the same circuitry to provide a positive signal. This signal may be connected to a use supplied solenoid or relay to power other

equipment with the vehicle. The LoadMGR continues to supply this output until the input voltage to the amplifier drops below a configurable level or until the ignition is turned off and the sleep timer expires.

[0046] In one example implementation, the InterClear circuit is internally current limited to one (1) amp. If an application requires higher currents, a power booster may be used. Also shown in FIG. **4** are the inputs **419**, **420** from the microphone which are connected via the control head **700**, including a radio re-broadcast (RRB) and/or microphone signal conditioning circuit **422**. There is also a microphone controlled switch **424** which is connected to a digital potentiometer **426** and an amplifier circuit **428** to control volume. The digital potentiometer **426** is controlled by via the I^2C port **434** to adjust the volume during PTT/PA (push-to-talk/public address) and RRB (radio re-broadcast) operation. During PTT/PA and RRB operation, an operator may adjust the volume setting and the adjusted setting is stored in memory. Thus, the amplifier microprocessor sub-module **500** (e.g., microprocessor **502**) stores in memory the previous digital volume control setting during each of PTT/PA and RRB operation and sets the potentiometer **426** at the previous setting the next time PTT/PA or RRB operation is actuated by the operator. Also part of the related connections are a circuit **430** controlling a DC bias of the audio circuit and a voice input **432** (audio power is indicated as V_{AP}).

[0047] The module **400** includes several I/O ports **434** for communication including an I^2C port for communicating with the light board module **600**, an SAE J1708 port for communicating with the control head **700** and a programming port for communication with a USB post of a computer having software for programming the processor **502** of the amplifier module **400**.

[0048] FIG. **5** is a block diagram of an example microprocessor sub-module for the amplifier module **400**. In this example, the microprocessor **502** for the amplifies module **400** is a PIC 16F887-E/PT processor although other processors may be used. Input/output (I/O) ports **504** include one or more of the following:

[0049] FET EN—to enable/disable siren output FETs **528** to the siren speakers;

[0050] HORN RELAY—to enable/disable the vehicle horn;

[0051] INTERCLEAR—to control InterClear feature output;

[0052] RRS EN—to enable/disable the RRB audio signal from going through the controlled switch **424**;

[0053] PTT EN—to enable/disable the PA audio signal from going through the controlled switch **424**;

[0054] HOLD ON—to hold power to the amplifier, the light board and the control head until the vehicle ignition is off and the sleep timer has expired;

[0055] POWER EN—to switch siren speaker output from full to reduced power out;

[0056] REMOTE—to monitor an external remote switch;

[0057] PARK KILL—to monitor the park switch; and

[0058] HORN RING—to monitor the status of the horn ring switch.

[0059] An ICSP port **506** is an in-circuit serial programming port for programming the microprocessor **502**. The microprocessor is connected to an overvoltage circuit **508** for monitoring the applied voltage and selectively shutting down components or a system when the voltage exceeds a preprogrammed maximum, e.g. 15 volts. An external clock **510** may be connected to the microprocessor **502**. An I^2C I/O port **512** is connected to and communicates with a light board module processor **602**. In order to prevent overheating, port **514** monitors temperature sensors positioned adjacent MOSFETs **528** driving the siren speakers **407**. Communications port **518** is connected to a USB communication interface such as an MCP2200 for connecting to a USB port of an external computer (e.g., laptop or desktop) to program the processor **502** which controls the amplifier module **400**. Port **520** connects to the control head **700** via an SAE J1708 circuit such as a D536277 transceiver. Digital and analog tones to the siren speakers are provided by either an analog tone timer circuit **524** controlled by and responsive to the microprocessor **502**, or by a digital tone signal **522** generated by the microprocessor **502**, via a flip-flop **526** and a MOSFET circuit **523** driving the speaker (s).

[0060] Input/Outputs to/from the microprocessor **502** include an I^2C data port for communicating with a light module processor **602**, a SIREN EN port for enabling the short circuit current sense circuit to allow for tone generation by the siren, a PTT port for monitoring the push-to-talk switch on the microphone, a I^2C CLOCK port for generating the clock pulses for I^2C communications, a VOX port for monitoring voice, a RESET port that may be connected to around for resetting the microprocessor **502** to factory default configuration, an ALARM port for sensing a user supplied monitor (such as a canine temperature sensor), and/or an IGNITION port for monitoring when the ignition is on or off).

[0061] In one example implementation, the system includes computer executable diagnostic instructions stored on a tangible computer readable media and executable by the amplifier module processor **502** for detecting one or more of the following system faults:

[0062] A configuration failure in which amplifier module **400** fails to successfully load configuration data at power up wherein in response to the configuration failure, the control head lights blink and a piezo buzzer sounds to visually and audibly signal an operator;

[0063] A communication failure in which the control head and amplifier module **400** are unable to establish data communications therebetween, wherein in response to the communication failure the control head signals the operator (e.g., visually and/or audibly) until communication is established; and

[0064] A blown fuse or no output voltage wherein in response to the blown fuse or no output voltage the control head signals the operator (e.g., audibly or via a flashing light).

[0065] In one example implementation, the amplifier module processor **502** implements programmable multiple siren tone sets responsive to activation of the following on the control head:

[0066] A WAIL push-button so that the microprocessor **502** generates a wail tone via speakers **407** when the WAIL push-button is pressed;

[0067] A YELP push-button so that the microprocessor **502** generates a yelp tone via speakers **407** when the YELP push-button is pressed;

[0068] A ALT TONE push-button so that the microprocessor **502** generates the Hi-Lo tone via speakers **407** when the ALT TONE push-button is pressed; and

[0069] A MANUAL push-button so that the microprocessor **502** generates a MANUAL wail tone via speakers **407** when the MANUAL push-button is pressed.

[0070] Usually, a PTT push-button is pressed on a microphone to activate the PTT function. In one example implementation, the amplifier module processor **502** resets the PTT function after a preset period (e.g., 30 seconds) of being held so that the reset returns to its previous condition even though the PTT push-button is still being held in the on position. This avoids the situation where the PTT push-button is "stuck" in the ON position for extended periods, such as beyond the preset period.

[0071] In one example implementation, computer executable instructions for providing a digital volume control are implemented by the amplifier module processor **502** including separate and independent volume control for radio rebroadcast (RRB) and public address (PA) transmissions of audio provided by a microphone connected to the control head. The microphone has a PTT (press-to-talk) push-button which is also responsive to a volume adjustment mode for digitally adjusting the potentiometer **426** to adjust the volume.

[0072] Optionally, the amplifier module processor **502** may execute computer instructions broadcasting two-way radio reception over the siren speakers **407** when a two-way radio is connected to an auxiliary port of the amplifier module **400**.

[0073] In FIG. **5**, the other inputs and outputs to the amplifier module **400** which are illustrated in FIG. **4** are directly or indirectly via circuits connected to the processor **502**. These inputs and outputs are represented by I/O ports **532**.

[0074] FIG. **6** is a block diagram of an example light module **600**. In this example, the microprocessor **602** for an emergency warning light, such as a light bar, may be any processor having serial and parallel ports, such as a PIC 16F887-E/PT processor. The microprocessor **602** interfaces with power stabilization circuitry **604** for controlling the voltage applied to the light bar. A light bar parallel communication port **606** connects to a centrally controlled light bar (i.e., an emergency warning light), to control the light bar. An Arrowstik® traffic directing light communication parallel port **698** controls the traffic directing device. An ICSP port **610** permits in circuit serial programming (ICSP). An external clock **612** is connected to the processor **602**. An I^2C I/O port **613** is connected to and communicates with the amplifier processor via port **512**. A CC Arrowstik connector **614** is for operating centrally controlled. Arrowstik® light products. An IC **616** is connected to the processor **602** to control the auxiliary circuits E-H **618**, **619**. Also, solid state relays **620** connect to the processor to control the level 1-3 connector circuit **624** and the auxiliary circuits AD **622**. Ports **626**, **628** also monitor the auxiliary A-F fuses and the level 1-3 fuses, respectively.

[0075] FIG. **7** is a block diagram of an example control head module. In this example, the microprocessor **702** for the control head may be a PIC 16F887-E/PT processor. The microprocessor **702** interfaces with a backlighting circuit **704** to dim the LED lighting for the flash, left, center, right, manual and air horn push buttons on the control head (FIGS. **1**A-**1**D, **2**). A control head communication connector **706** connects to the SAE port of the amplifier microprocessor **502** via an SAE circuit **724** and to the PA microphone via connector **708**. A connector **710** provides a programming input to the processor **702**, which also connects level 1-3 switch circuit **712** (e.g., the red toggle switch) and the push buttons for manual siren and air horn operation **714**. An Arrowstik simulator circuit **716** on the face of the control head is driven by the processor **702** to indicate that the traffic directing signal is illuminating a move right pattern, a move left pattern, a move left or right pattern or a flash pattern. Three LEDs indicating the position of the toggle switch and thus the level of operation are connected at **718**. The button controls for the Arrowstik® light are connected at **720**. An internal audio device (e.g., piezo buzzer or speaker) for the control head (e.g., to beep or sound alarms) is connected at **722**. The push buttons for auxiliary A-H, dim, wail, yelp and alternative tone on the face of the control head **700** are connected at **726**.

[0076] Optionally, the control head processor **702** may include a configurable light alert function in which an audible signal is generated on a periodic basis when any lighting is activated including auxiliary and traffic directing lighting.

[0077] In one example implementation, at least one of the processors is programmed to implement a configurable power manager function or a configurable load, manager function. For example, at least one of the processors is programmed to implement monitoring voltages or currents of components and includes de-energizing a component having a monitored voltage or a monitored current outside a preset range. As another example, at least one of the processors is programmed so implement monitoring current or voltage of the power supply and includes dropout voltage groups wherein a user selects one or more groups of outputs of she system to de-energize when the power supply levels fall below a specified voltage level for each selected group. In one embodiment, the preset range and/or the specified voltage level are each configurable by the user via a USB port connected to one of the processors. Alternatively or in addition, a delay may be specified before a group is dropped out.

[0078] In one example implementation, at least one of the processors implements a user configurable input voltage monitoring and dropout function in which an input voltage from the power supply is monitored and one or more operations are disabled when the input voltage is outside a user configurable range.

[0079] In one example implementation, at least one of the processors includes a lock function selectable at configuration such that a remote input, activates the lock function allowing only allow siren tones to be generated via the speakers when a signal (positive or negative as set in configuration) is applied to the remote input. This function meets certain requirements of the European Union.

[0080] In one example implementation, at least one of the processors includes a user configurable function which when activated by the use disables speaker Alt Tone functions and disables speaker Air Horn functions when any tone or light is active. This function meets certain requirements of California Title 13.

[0081] In one example implementation, at least one of the processors implements a load manager function and/or a configurable delayed shutoff function wherein the load manager when configured controls the power to other equipment in the vehicle through an external solenoid. The configurable delayed shutoff function when configured includes a sleep delay timer such that the system remains active after the vehicle ignition is turned off for the duration of the sleep delay timer.

[0082] The load manages function and/or the delayed shutoff function control the power supplied to other loads in the vehicle such that the power to these other loads are turned off

when the use turns off the vehicle ignition and/or the voltage of the battery for the vehicle has dropped below a predetermined voltage level.

[0083] For purposes of illustration, programs and other executable program components, such as the operating system, are illustrated herein as discrete blocks. It is recognized, however, that such programs and components reside at various times in different storage components of the computer, and are executed by the data processor (s) of the computer.

[0084] Although described in connection with an exemplary computing system environment, example implementations are operational with numerous other general purpose or special purpose computing system environments or configurations. The computing system environment is not intended to suggest any limitation as to the scope of use or functionality of any aspect of the invention. Moreover, the computing system environment should not be interpreted as having any dependency or requirement relating to any one or combination of components illustrated in the exemplary operating environment. Examples of well-known computing systems, environments, and/or configurations that may be suitable for use with aspects of the invention include, but are not limited so, personal computers, server computers, hand-held or laptop devices, multiprocessor systems, microprocessor-based systems, set top boxes, programmable consumer electronics, mobile telephones, network PCs, minicomputers, mainframe computers, distributed, computing environments that include any of the above systems or devices, and the like.

[0085] The example implementations may be described in the general context of data and/or computer-executable instructions, such as program modules, stored one or more tangible computer storage media and executed by one or more computers or other devices. Generally, program modules include, but are not limited to, routines, programs, objects, components, and data structures that perform particular tasks or implement particular abstract data types. Example implementations may also be practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote computer storage media including memory storage devices.

[0086] In operation, computers and/or servers may execute the computer-executable instructions such as those illustrated herein to implement aspects of the invention.

[0087] Examples may be implemented with computer-executable instructions. The computer-executable instructions may be organized into one or more computer-executable components or modules on a tangible computer readable storage medium. Examples may be implemented with any number and organization of such components or modules. For example, Example implementations are not limited to she specific computer-executable instructions or the specific components or modules illustrated in she figures and described herein. Other example implementations may include different computer-executable instructions or components having more or less functionality than illustrated and described herein.

[0088] The order of execution or performance of the operations in examples illustrated and described herein is not essential, unless otherwise specified. That is, the operations may be performed in any order, unless otherwise specified, and example implementations may include additional or fewer operations than those disclosed herein. For example, it is contemplated that executing or performing a particular operation before, contemporaneously with, or after another operation is within the scope of the example implementations.

[0089] When introducing elements of example implementations, the articles "a," "an," "the," and "said" are intended to mean that there are one or more of the elements. The terms "comprising," "including," and "having" are intended to be inclusive and mean that there may be additional elements other than the listed elements.

[0090] Not all of the depicted components illustrated or described may be required. In addition, some example implementations may include additional components. Variations in the arrangement and type or the components may be made without departing from the spirit or scope of the claims as set forth herein. Additional, different or fewer components may be provided and components may be combined. Alternatively or in addition, a component may be implemented by several components.

[0091] The above description illustrates the invention by way of example and not by way of limitation. This description enables one skilled in the art to make and use the invention, and describes several example implementations, adaptations, variations, alternatives and uses of the invention, including what is presently believed to be the best mode of carrying out the invention. Additionally, it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of components set forth in the following description or illustrated in the drawings. The invention is capable of other example implementations and of being practiced or carried out in various ways. Also, it will be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting.

[0092] Having described aspects of the invention in detail, it will be apparent that modifications and variations are possible without departing from the scope of aspects of the invention as defined in the appended claims. As various changes could be made in the above constructions, products, and methods without departing from the scope of aspects of the invention, it is intended that all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

APPENDIX 1

Functions Controlled by Amplifier Module Processor

[0093] 1. Receive data from Control Head via CAT5 cable.

[0094] 2. Transmit data to Control Head via CAT5 cable.

[0095] 3. Receive data from Light Board Head via internal cable.

[0096] 4. Transmit data to Light Board via internal cable.

[0097] 5. Receive configuration data from computer via USB connector.

[0098] 6. Transmit configuration data to computer via USB connector.

[0099] 7. Store all configuration settings for system in EEPROM,

[0100] 8. Store Control Head Backlight Intensity in EEPROM.

[0101] 9. Monitor DC Input voltage from vehicle.

[0102] 10. Shut down Siren Tones if voltage above 15 VDC.

[0103] 11. Shut down multiple outputs based on Load Manager configuration settings.

[0104] 12. Monitor Vehicle Ignition to turn on and off the system.

[0105] 13. Run Sleep Timer based on configuration settings.

[0106] 14. Turn on or off LightAlert.

[0107] 15. Generate all siren tones (Wail, Yelp, Hyper-Yelp 1, Hyper-Yelp 2, Hi-Lo 1, Hi-Lo 2, Hyper Hi-Lo 1, Hyper Hi-Lo 2, Air Horn 1, Air Horn 2, Manual Wail, Whoop, Alarm).

[0108] 16. Monitor PTT switch for PA.

[0109] 17. Turn on or off VOX for PA and RRB.

[0110] 18. Turn on and off Audio circuits for running PA and RRB.

[0111] 19. Store PTT/PA and RRB volume settings in EEPROM.

[0112] 20. Set PTT/PA and REP volume based on settings using by controlling a digital pot.

[0113] 21. Turn on or off Current Sense for siren output short circuit protection.

[0114] 22. Determine Auxiliary Button operation based on configuration settings (Toggle On/Off, Momentary, 8 s Delay, RRB, Hands-Free).

[0115] 23. Determine 3-Level Switch operation based on configuration settings (Progressive, Independent, Semi-Progressive, User Defined).

[0116] 24. Determine ArrowStik Button operation based on configuration settings.

[0117] 25. Set Conventional ArrowStik Flash Patterns and Flash Rates based on configuration settings.

[0118] 26. Monitor Alarm Input and sound Alarm when active.

[0119] 27. Monitor Park Kill input and control Siren Tones, 3-Level Switch and Auxiliary Buttons based on configuration settings.

[0120] 28. Monitor Remote input and respond to signal based on configuration settings.

[0121] 29. Monitor Horn Ring input and respond to signal based on configuration settings.

[0122] 30. Control Horn Ring Transfer Relay.

[0123] 31. Monitor PET temperature using separate Temperature sense devices during PA and RRB modes.

[0124] 32. Shut down PA and RRB if temperature is too high.

[0125] 33. Monitor Master Reset input and reset system to factory default configuration.

APPENDIX 2

Functions Controlled by Control Head Module Processor

[0126] 1. Monitor 3-Level Switch position.

[0127] 2. Monitor all Auxiliary Buttons to determine if operator presses a button.

[0128] 3. Monitor all ArrowStik Buttons to determine if operator presses a button.

[0129] 4. Monitor DIM Button to determine if operator presses button.

[0130] 5. Monitor Wail, Yelp and Alt Tone Buttons to determine if operator presses a button.

[0131] 6. Monitor Manual and Air Horn Buttons to determine if operator presses a button.

[0132] 7. Transmit data to Amplifier via CAT5 cable.

[0133] 8. Receive data from Amplifier via CAT5 cable.

[0134] 9. Set Backlight Intensity based on settings stored in Amplifier processor.

[0135] 10. Adjust Backlight Intensity and transmit value to Amplifier processor.

[0136] 11. Adjust PTT/PA volume and transmit value to Amplifier processor.

[0137] 12. Adjust RRB volume and transmit value to Amplifier processor.

[0138] 13. Generate Flash Pattern and Flash Rate for ArrowStik indicator LEDs based on data received, from Amplifier processor.

[0139] 14. Control Auxiliary Button active LEDs based on data received from Amplifier processor.

[0140] 15. Control Wail, Yelp and Alt Tone Button active LEDs based on data received from Amplifier processor.

[0141] 16. Control DIM Button active LED based on data received from Amplifier processor.

[0142] 17. Control 3-Level Switch LEDs based on data received from Amplifier processor.

[0143] 13. Dim Arrowstik® light and 3-Level Switch LEDs when Dim mode is active.

[0144] 19. Generate LightAlert beep when LightAlert is active.

[0145] 20. Set LightAlert beep rate.

[0146] 21. Generate Key Click beep whenever any button is pressed.

[0147] 22. Blink 3-Level. LED indicators based on fuse data received from Amplifier processor.

[0148] 23. Blink Auxiliary LED indicators based on fuse data received from Amplifier processor.

[0149] 24. Blink Level 3 LED indicator based on Park Kill data received from Amplifier processor.

APPENDIX 3

Functions Controlled by Light Module Processor

[0150] 1. Receive data from Amplifier via internal cable.

[0151] 2. Transmit data to Amplifier via internal cable.

[0152] 3. Turn on and off Level 1, Level 2, Level 3A and Level 3B outputs based on data received from Amplifier processor.

[0153] 4. Turn on and of all Auxiliary (a thru H) outputs based on data received from Amplifier processor.

[0154] 5. Set Auxiliary G and H polarity (either can be a positive or negative output) based on data received from Amplifier processor.

[0155] 6. Turn on and off Left, Right, Center and Flash outputs for controlling a central controlled Arrowstik® light.

[0156] 7. Turn on and off Dim output.

[0157] 8. Generate Flash Pattern and Flash Rate for conventional Arrowstik® light outputs.

[0158] 9. Turn on and off conventional Arrowstik® light outputs.

[0159] 10. Transmit RLS protocol data to Code 3® Serial Lightbar (PX2700CC and Defender® Serial Lightbars).

[0160] 11. Monitor Level 1, Level 2, Level 3A and Level 3B output fuses.

[0161] 12. Transmit Level 1, Level 2, Level 3A and Level 3B fuse state to Amplifier processor.

[0162] 13. Monitor Auxiliary A thru F output fuses.

[0163] 14. Transmit Auxiliary A thru F fuse state to Amplifier processor.

APPENDIX 4

Z3 Technical Specification

Design and Feature Description

[0164] The siren control head has improved spill resistance.

[0165] The siren employs quick connect/disconnect technology to allow faster removal from vehicle.

[0166] The siren provides convenient, easy access to the user-replaceable fuses.

[0167] The control head provides warning indication of blown fuses

[0168] The siren has the ability to connect to the existing serial light bar through an interface/data cable.

[0169] The siren has the ability to operate centrally-controlled light, bars, as well as a Code 3® Arrowstik® lights.

[0170] The design platform uses flash programming for configuration where appropriate and/or feasible (instead of DIP switches or straps).

[0171] The siren can be configured by computer. The siren connects to the computer by USB cable. 12V must be applied to the siren during computer configuration.

[0172] The siren operating modes is configurable via software that runs on all versions of Microsoft Windows XP (Service Pack 3) through Windows 7 operating systems.

[0173] The siren configuration software provides "active acknowledgement" warnings (configuration personnel must click "OK" on warning message) to set configuration modes chat contradict either established standards or conventional operation.

[0174] The siren control head alerts the user of system faults by piezo buzzer beeps and/or LED flashes. The faults which can be indicated are

[0175] Configuration Failure (siren fails to successfully load configuration data at power up). Control head beeps and flashes all LEDs 5 times and then starts normal operation with Factory Default configuration.

[0176] Communication Failure (control head and siren amplifier are unable to establish data communications). Control Head beeps and flashes all LEDs every 2 seconds until communication is established.

[0177] Blown fuse or no output voltage for Levels 1, 2, 3A or 3B. 3-Level LEDs blinks rapidly to indicate that function is active, but no output voltage is being supplied.

[0178] Blown fuse or no output voltage for Auxiliary outputs A through F. Auxiliary LEDs blinks rapidly to indicate that function is active, but no output voltage is being supplied.

[0179] The siren provides extensive Load Management functionality as described below

[0180] The siren's under-voltage and over-voltage fault response is configurable as follows:

[0181] The siren allows for 3 distinct function groups (Group 1, Group 2 and Group 3).

[0182] Each group's under-voltage fault threshold voltage can be individually set within the range of 10V to 12V in steps of 0.25V.

[0183] The functions to be contained in each group are selectable at configuration. The function choices are:

Level 1	Auxiliary A	Auxiliary E
Level 2	Auxiliary B	Auxiliary F
Level 3A	Auxiliary C	Auxiliary G
Level 3B	Auxiliary D	Auxiliary H
ArrowStik controls (selectable as a group)		
LoadMGR (disables InterClear)		

[0184] Once selected, function assignments to group are unique. In other words, a function cannot be assigned simultaneously to more than one group.

[0185] When the siren supply voltage drops: below a group's threshold voltage and stays for a preset amount of time (configurable between 1 to 5 minutes in 1 minute increments), the functions contained in that group cannot be activated.

[0186] The group's functions are disabled until power is cycled no the Ignition input (the system must be turned off and then turned back on again in order to reset the disabled functions).

[0187] LoadMGR uses the InterClear output when configured (disables InterClear feature) and can be used to control the power to other equipment in the vehicle through a customer provided high current solenoid. The LoadMGR also works with the Sleep Timer and remains active after the ignition is turned off for the duration of the Sleep Timer.

[0188] The siren tones auto-shutdown (no functionality) when over-voltage condition (15V or greater) is sensed. Normal operation resumes when the over-voltage condition is no longer sensed.

[0189] The siren has the capability to force a reset to default configuration. To minimize accidental activation, this capability is not be easily accessible.

[0190] The siren control head buttons' brightness is controlled by the LEFT and RIGHT arrow keys.

[0191] The siren is compatible with + or − switched vehicles for Park-Kill and Horn Ring inputs.

[0192] The siren provides a "stuck microphone" disable feature when in PA mode for greater than 30 seconds.

[0193] The siren has a configurable Park Kill functionality.

[0194] The design provides horn-ring and horn-ring scroll feature with scroll on/off.

[0195] The 3-Level switch output has L1, L2, L3A and L3B outputs. The user can configure which L3 output (if any) drops out with Park Kill.

[0196] Each of the 8 auxiliary out of the siren is rated as follows: A-D 4-5 A, E-H 4-10 A; 50 A total.

[0197] Each of the L1, L2 and L3 outputs is rated for 15 A, 50 A total.

[0198] The siren is designed for multiple tone sets, selectable during configuration.

[0199] The siren provides the standard basic tones and patterns (wail, yelp, hi-lo, air horn) as per applicable standards. Users will have to make special efforts to configure the product to perform in a non-standards compliant, manner.

[0200] The siren is designed to accept an optional second amplifier to provide simultaneous dual tones (including low frequency signal). Therefore, simultaneous dual

tone output require separate speakers for each amplifier (1 or 2 speakers per amplifier).

[0201] The siren has an EU Lock feature selectable at configuration. When selected the Remote input is used for this feature and all other functions of the Remote input is disabled. The EU Lock will only allow siren tones to be generated when a signal (positive or negative as set in configuration) is applied to the Remote input.

[0202] Each Level switch setting (Level 1, Level 2, Level 3) can be configured as follows:

[0203] Disabled

[0204] Siren activated

[0205] Horn Ring Transfer activated

[0206] ArrowStik switches activated (LEFT, CENTER, RIGHT, FLASH)

[0207] Auxiliary switches activated (AUX A, AUX B, AUX C, AUX D, AUX E, AUX F, AUX G, AUX H)

[0208] The WAIL and YELP switches can select from the following override tone choices:

[0209] Yelp (software issues warning if primary and override tones are set to be identical).

[0210] Wail (software issues warning if primary and override tones are set to be identical).

[0211] Hyper-Yelp 1

[0212] Hyper Yelp 2

[0213] Hi-LO 1

[0214] Hi-Lo 2

[0215] Hyper-Lo 1

[0216] Hyper-Lo 2

[0217] Air Horn 1

[0218] Air Horn 2

[0219] The ALT TONE switch can be configured as follows (disabled automatically when CA T13 mode selected):

[0220] Wail

[0221] Yelp

[0222] Hyper-Yelp 1

[0223] Hyper-Yelp 2

[0224] Hi-Lo 1

[0225] Hi-Lo 2

[0226] Hyper-Lo 1

[0227] Hyper-Lo 2

[0228] Air Horn 1

[0229] Air Horn 2

[0230] Override Tone choice (software issues warning if primary and override tones are set to be identical).

[0231] Wail

[0232] Yelp

[0233] Hyper-Yelp 1

[0234] Hyper-Yelp 2

[0235] Hi-Lo 1

[0236] Hi-Lo 2

[0237] Hyper-Lo 1

[0238] Hyper-Lo 2

[0239] Air Horn 1

[0240] Air Horn 2

[0241] The MANUAL switch can be configured as follows:

[0242] Enabled

[0243] Siren Active:

[0244] None

[0245] Hit & Go

[0246] Scroll

[0247] Manual Wail

[0248] Whoop

[0249] Siren Inactive

[0250] None

[0251] Manual Wail

[0252] NOTE: When MANUAL button is configured to Siren Inactive/Manual Wail mode, the following light switch control settings are available when the MANUAL button is pressed:

[0253] None—NOTE: The configuration software provides a warning when this setting is selected since it is not usually desired to have siren without warning lights.

[0254] Level 1 and/or Level 2 and/or Level 3A and/or Level 3B

[0255] Auxiliary A and/or Auxiliary B and/or Auxiliary C and/or Auxiliary D and/or Auxiliary E and/or Auxiliary F and/or Auxiliary G and/or Auxiliary H

[0256] Whoop

[0257] NOTE: When MANUAL button is configured to Siren Inactive/Whoop mode, the following light switch control settings are available when the MANUAL button is pressed:

[0258] None—NOTE: The configuration software provides a warning when this setting is selected since it is not usually desired to have siren without warning lights.

[0259] Level 1 and/or Level 2 and/or Level 3

[0260] Auxiliary A and/or Auxiliary B and/or Auxiliary C and/or Auxiliary D and/or Auxiliary E and/or Auxiliary F and/or Auxiliary G and/or Auxiliary H

[0261] Hands-Free Scroll

[0262] None

[0263] Scroll

[0264] Manual Wail

[0265] Whoop

[0266] None—NOTE: The configuration software provides a warning when this setting is selected since it is not usually desired to have siren without warning lights.

[0267] Level 1 and/or Level 2 and/or Level 3

[0268] Auxiliary A and/or Auxiliary B and/or Auxiliary C and/or Auxiliary D and/or Auxiliary E and/or Auxiliary F and/or Auxiliary G and/or Auxiliary H

[0269] The AIR HORN switch can be configured as follows (disabled [siren active mode] when CA T13 mode is selected):

[0270] Enabled:

[0271] Always Enabled

[0272] Disabled when Siren active

[0273] Always Disabled

[0274] Air Horn 1

[0275] Air Horn 2

[0276] The Auxiliary A through F switches (center top six buttons) can be configured as follows:

[0277] Function

[0278] Toggle (On/Off)

[0279] Momentary

[0280] 8 Seconds Delay

[0281] Radio Rebroadcast

[0282] Hands-Free Scroll

[0283] Disabled

[0284] Activate Auxiliary Switches: chose A through H

[0285] The Auxiliary G through H switches (center bottom two buttons) can be configured as follows:

[0286] Select Polarity (+12V or Ground)

[0287] Function

[0288] Toggle (On/Off)

[0289] Momentary

[0290] 8 Seconds Delay

[0291] Radio Rebroadcast

[0292] Hands-Free Scroll

[0293] Disabled

[0294] Activate Auxiliary Switches: chose A through H

[0295] The LEFT, CENTER, and RIGHT ArrowStik control switches can be configured as follows:

[0296] Disabled

[0297] Pattern: Chose either Building, Building 3 Flash, Traveling Ball 3 Flash, Build/Collapse

[0298] Rate: Chose either Slow, Medium, Fast

[0299] The FLASH switch can be configured as follows

[0300] Disabled

[0301] Pattern: Chose either Standard, Simultaneous, Even/Odd, Left/Right, Traveling Ball

[0302] Rate: Chose either Single Flash 75 FPM, Single Flash 110 FPM, Single Flash 220 FPM, Quad Flash

[0303] In addition, the following configurable features are provided:

[0304] 3-Level Switch Configurations

[0305] Progressive

[0306] Level 1—Level 1 Output

[0307] Level 2—Level 1 & Level 2 Outputs

[0308] Level 3—Level 1, Level 2, Level 3A & Level 3B Outputs

[0309] Independent

[0310] Level 1—Level 1 Output

[0311] Level 2—Level 2 Output

[0312] Level 3A & Level 3B Outputs

[0313] Semi-Progressive

[0314] Level 1—Level 1 Output

[0315] Level 2—Level 2 Output

[0316] Level 3—Level 1, Level 2, Level 3A & Level 3B Outputs

[0317] User Defined Configurations:

[0318] Level 2 Configuration:

[0319] Level 2 Output

[0320] Level 1 & Level 2 Outputs

[0321] Level 3 Configuration:

[0322] Level 3 Output

[0323] Level 1, Level 3A & Level 3B Outputs

[0324] Level 2, Level 3A & Level 3B Outputs

[0325] Level 1, Level 2, Level 3A & Level 3B Outputs

[0326] Non CC ArrowStik Configurations (Applies to all ArrowStik Switches):

[0327] None

[0328] 5 Head

[0329] End Flash Enable

[0330] 6 Head

[0331] End Flash Enable

[0332] 8 Head [NOTE: End Flash Not Available)

[0333] Enable PWM Dimming

[0334] Horn Ring

[0335] Enable

[0336] Enable with Horn Ring Transfer

[0337] Always Enabled

[0338] Polarity

[0339] Negative Activation

[0340] Positive Activation

[0341] Siren Active

[0342] Hit & Go

[0343] Scroll

[0344] Scroll On/Off

[0345] Manual Wail

[0346] Whoop

[0347] Air Horn 1

[0348] Air Horn 2

[0349] Siren inactive

[0350] None

[0351] Manual Wail

[0352] Whoop

[0353] Air Horn 1

[0354] Air Horn 2

[0355] Note: The Horn Ring always controls the Hands-Free Scroll when the feature is activated.

[0356] Park Kill

[0357] Polarity

[0358] Negative Activation

[0359] Positive Activation

[0360] Siren Control

[0361] Siren Stand By

[0362] Level 3 Switch Control

[0363] Level 3A Stand By

[0364] Level 3B Stand By

[0365] Auxiliary Switch Control

[0366] Auxiliary A No Impact

[0367] Auxiliary A Off

[0368] Auxiliary A Off while transmission in Park

[0369] Auxiliary B No Impact

[0370] Auxiliary B Off

[0371] Auxiliary B Off while transmission in Park

[0372] Auxiliary C No Impact

[0373] Auxiliary C Off

[0374] Auxiliary C Off while transmission in Park

[0375] Auxiliary D No Impact

[0376] Auxiliary D Off

[0377] Auxiliary D Off while transmission in Park

[0378] Auxiliary E No Impact

[0379] Auxiliary E Off

[0380] Auxiliary E Off while transmission in Park

[0381] Auxiliary F No impact

[0382] Auxiliary F Off

[0383] Auxiliary F Off while transmission in Park

[0384] Auxiliary G No impact

[0385] Auxiliary G Off

[0386] Auxiliary G Off while transmission in Park

[0387] Auxiliary H No Impact

[0388] Auxiliary H Off

[0389] Auxiliary H Off while transmission in Park

[0390] LightAlert

[0391] 3-Level Switch Enable/Disable

[0392] Auxiliary Switches Enable/Disable

[0393] ArrowStik Switches Enable/Disable

[0394] Sleep Mode Time Out

[0395] Instant

[0396] 10 minutes

[0397] 20 minutes

[0398] 30 Minutes

[0399] CA T13 (Automatically disables Alt Tone and Disables the Air Horn if any Tone or Light is active.)
[0400] Enable/Disable
[0401] Remote In
[0402] Enable
[0403] Enable with Horn Ring Transfer
[0404] Always Enabled
[0405] Polarity
[0406] Negative Activation
[0407] Positive Activation
[0408] Siren Active
[0409] Hit & Go
[0410] Scroll
[0411] Scroll On/Off
[0412] Manual Wail
[0413] Whoop
[0414] Air Horn 1
[0415] Air Horn 2
[0416] Siren inactive
[0417] None
[0418] Manual Wail
[0419] Whoop
[0420] Air Horn 1
[0421] Air Horn 2
[0422] Hands-Free Scroll
[0423] None
[0424] Scroll—On—Hold Off
[0425] Manual Wail
[0426] Whoop
[0427] Air Horn 1
[0428] Air Horn 2
[0429] EU Lock
[0430] Enable (disables Siren Active, Siren Inactive and Hands-Free features of Remote)

Operating Conditions:

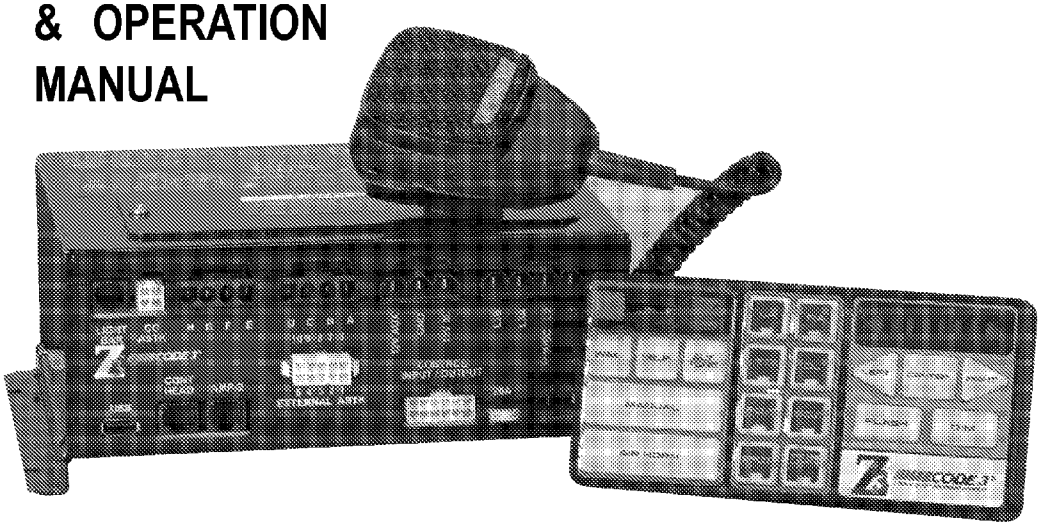
[0431] Operating Voltage: 10-15 VDC (negative ground)

Operating Current:

[0432] ~8 A when delivering 100 W into 11 Ohm load (13.6 VDC)
[0433] ~18 A when delivering 200 W into 5.5 Ohm load (13.6 VDC)

Standby Current: <10 mA with backlighting
Amplifier Performance: 3 dB bandwidth 500 Hz to 3 KHz (minimum) relative to 1 KHz
Total Harmonic Distortion <10% (below clipping)

APPENDIX 5
INSTALLATION & OPERATION MANUAL



CODE 3®
A PUBLIC SAFETY EQUIPMENT COMPANY

Z3™ SERIES
SIREN AND CONTROL HEAD

PATENT PENDING

⚠ WARNING

Sirens produce loud sounds that may damage hearing
- Wear hearing protection when testing
- Use siren only for emergency response
- Roll up windows when siren is operating
- Avoid exposure to the siren sound outside of vehicle

Contents:

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IMPORTANT: *Read all instruction and warnings before installing and using.*
INSTALLER: This manual must be delivered to the end user of this equipment.

Introduction

The Siren is a new remote control electronic siren that has been designed to meet the needs of all emergency vehicles. The Siren incorporates many of the popular features of the past and uses microprocessor based circuitry and MOSFET technology. All standard features are available along with many new features that are not available on any other Code 3 siren: Fully Configurable 3-Level Switch, Selectable Tones, Adjustable Backlighting and much more.

WARNING

Sirens are an integral part of an effective audio/visual emergency warning system. However, sirens are only short range secondary warning devices. The use of a siren does not insure that all drivers can or will observe or react to an emergency warning signal, particularly at long distances or when either vehicle is traveling at a high rate of speed. Sirens should only be used in a combination with effective warning lights and never relied upon as a sole warning signal. Never take the right of way for granted. It is your responsibility to be sure you can proceed safely before entering an intersection driving against traffic, or responding at a high rate of speed.

The effectiveness of this warning device is highly dependent upon correct mounting and wiring. Read and follow the manufacturer's instructions before installing this device. The vehicle operator should check the equipment daily to insure that all features of the device operate correctly.

To be effective, sirens must produce high sound levels that potentially can inflict hearing damage. Installers should be warned to wear hearing protection, clear bystanders from the area and not to operate the siren indoors during testing. Vehicle operators and occupants should assess their exposure to siren noise and determine what steps, such as consultation with professionals or use of hearing protection should be implemented to protect their hearing.

This equipment is intended for use by authorized personnel only. It is the user's responsibility to understand and obey all laws regarding emergency warning devices. The user should check all applicable city, state and federal laws and regulations. Code 3, Inc., assumes no liability for any loss resulting from the use of this warning device.

Proper installation is vital to the performance of the siren and the safe operation of the emergency vehicle. It is important to recognize that the operator of the emergency vehicle is under psychological and physiological stress caused by the emergency situation. The siren system should be installed in such a manner as to: A) Not reduce the acoustical performance of the system, B) Limit as much as practical the noise level in the passenger compartment of the vehicle, C) Place the controls within convenient reach of the operator so that he can operate the system without losing eye contact with the roadway.

Emergency warning devices often require high electrical voltages and/or currents. Properly protect and use caution around live electrical connections. Grounding or shorting of electrical connections can cause high current arcing, which can cause personal injury and/or severe vehicle damage, including fire.

PROPER INSTALLATION COMBINED WITH OPERATOR TRAINING IN THE PROPER USE OF EMERGENCY WARNING DEVICES IS ESSENTIAL TO INSURE THE SAFETY OF EMERGENCY PERSONNEL AND THE PUBLIC.

Standard Features

The Siren consists of a remotely mounted siren amplifier with integral lighting control. This is operated by a compact control panel designed to be conveniently mounted near the operator. This model includes the following standard features:

- Primary Push-Buttons: WAIL, YELP, ALT TONE (Default Tone for ALT TONE is Hi-Lo 1 but can be configured to use other tones)
- Secondary Tones: Multiple User Configurable Tones
- MANUAL Push-Button: Default tone is the Manual Wail.
- AIR HORN Push-Button: Multiple User Configurable Tones.
- 8 Auxiliary Controls: Default to control Auxiliary A through Auxiliary H outputs. Can be configured to control multiple Auxiliary outputs from one Auxiliary push-button.
- ArrowStik Control: Muliple User Configurable Flash Patterns (For use with conventional ArrowStik).
- Integrated Centrally Controlled ArrowStik
- Integrated Code 3 Serial Lightbar Control

WARNING

IMPORTANT WARNINGS TO USERS OF SIRENS: "Wail" and "Yelp" tones are in some cases (such as the state of California) the only recognized siren tones for calling for the right of way. Ancillary tones such as "Air Horn", "Hi-Lo", "Hyper-Yelp", and "Hyper-Lo" in some cases do not provide as high a sound pressure level. It is recommended that these tones be used in a secondary mode to alert motorists to the presence of multiple emergency vehicles or to the momentary shift from the primary tone as an indication of the imminent presence of any emergency vehicle.

The following features are standard in the Z Siren (tones and sequences may differ with user selectable configuration):

Control Head Configurable (In Vehicle)

Adjustable Backlighting - Backlighting is independent of siren status. The dimming of the lit push-buttons can be adjusted as desired. Press and hold either the LEFT or RIGHT push-buttons for one second. This puts the Control Head into an adjustment mode for the backlighting. Repeatedly press or hold the RIGHT push-button to increase the brightness or the LEFT push-button to decrease the brightness. The brightness can be decreased down to include an off condition. Press the DIM push-button to exit from this adjustment mode.

Microphone Volume Adjustment - Press and hold the PTT push-button on the microphone. Then press and hold the Left or Right push-button for one second to enter the volume adjustment mode. Then press the Left or Right arrow push-buttons to decrease or increase the volume, respectively. Once it's adjusted to the desired volume, press the DIM push-button or release the PTT push-button to save the setting.

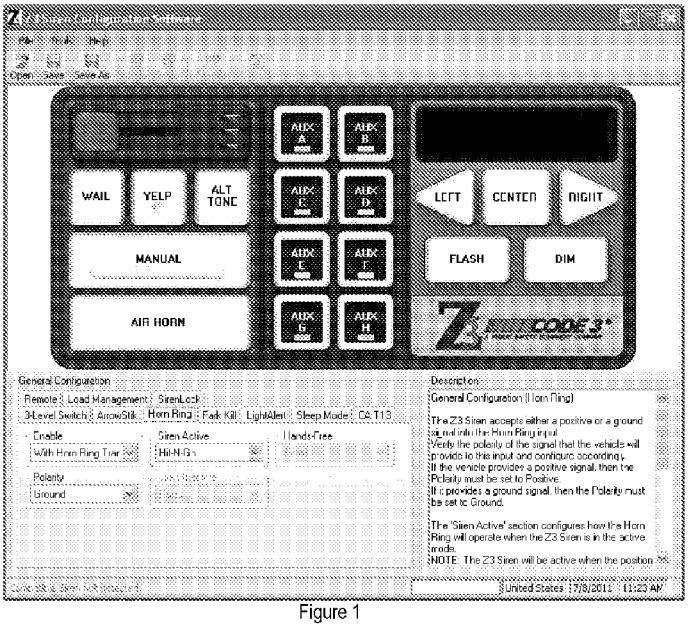


Figure 1

Radio Rebroadcast (RRB) - Broadcast two-way radio reception over siren speakers. These inputs are transformer coupled to prevent loading of the radio. The audio from the 2-way radio is rebroadcast over the siren speakers. The siren tones do not operate when this is activated. All other control functions operate normally. To connect in the signal to be broadcast, simply tie the two signal lines to the RRB1 and RRB2 inputs of the Amplifier (polarity is not an issue). The default setting of the Z Siren has this option turned off. See the Z Software User Manual for configuring one of the Auxiliary push-buttons for activating this feature. Once configured to an Auxiliary push-button and that push button is activated, only then can the volume be adjusted by holding down the RIGHT or LEFT push-button for one second. Then pressing the RIGHT or LEFT push-button increases or decreases the volume. Pressing the DIM push-button will save the settings. There is also a time-out but will save the settings before exiting as well. The RRB feature will automatically shutoff to protect from overheating of the Z Siren.

Computer Configurable

WAIL Push-Button - This push-button produces the Wail tone when pressed. By default, it also turns on the Level 3 lights but this is configurable to Level 2, Level 1, or no lights. The override tone is also configurable for this feature. Pressing the push-button a second time turns this feature off. Operation of this feature is affected by SirenLock, 3-Level Switch, and Park Kill features. See these sections for details.

YELP Push-Button - This push-button produces the Yelp tone when pressed. By default, it also turns on the Level 3 lights but this is configurable to Level 2, Level 1, or no lights. The override tone is also configurable for this feature. Pressing the push-button a second time turns this feature off. Operation of this feature is affected by SirenLock, 3-Level Switch, and Park Kill features. See these sections for details.

ALT TONE Push-Button - Both the primary and override tones are configurable for this push-button. This push-button produces the Hi-Lo 1 tone when pressed. It also turns on the Level 3 lights but this is configurable to Level 2, Level 1, or no lights. The override tone is the Hyper-Lo 1 tone. Pressing the push-button a second time turns this feature off. This push-button can be disabled in the configuration software. Operation of this feature is affected by SirenLock, 3-Level Switch, and Park Kill features. See these sections for details.

MANUAL Push-Button - In its default configuration, this push-button generates the Manual Wail tone. When pressed, the Manual Wail tone will ramp up to its highest tone and hold. It will hold as long as the MANUAL push-button is held. When the MANUAL push-button is released, the tone will ramp down and return to the previous function. The configuration software can change this to be in Hit-N-Go mode, Scroll mode, or Wail Stop mode. This can also be configured to react differently based on Siren status. Operation of this feature is affected by SirenLock, 3-Level Switch, and Park Kill features. See these sections for details.

AIR HORN Push-Button - In its default configuration, the AIR HORN push-button produces the Air Horn 1 tone as long as it is pressed. It will override all other siren tones. The configuration software can set this tone to Air Horn 1 or Air Horn 2. The AIR HORN push-button will work with Park Kill and SirenLock but can be configured to be disabled. See the Z Siren Configuration Software User Manual for configuration details.

Auxiliary A-H Push-Buttons - As configured by the Siren Configuration Software, eight on/off Auxiliary push-buttons are readily accessible for controlling the Auxiliary outputs of the Amplifier. Each Auxiliary push-button can be custom labeled with the supplied label kit. Each push-button is backlighted when activated to alert the operator. The default setting is for each Auxiliary push-button to control the corresponding Auxiliary output of the Amplifier. Auxiliary A through F supplies power to the load through the connector pins labeled A thru F. Auxiliary G and H supplies power with a positive or ground voltage to the load through the connector pins labeled G and H.

3-Level Switch - The Control Head provides a 3-Level switch for changing the emergency warning mode. The 3-Level switch is located in the top left corner of the control head. When the 3-Level switch is switched to the far left position, the unit is off. When the 3-Level switch is in the first position from the left, the level 1 configuration of the lights is turned on. When the 3-Level switch is in the second position from the left, the level 1 & 2 configuration of lights are turned on. When the 3-Level switch is in the third position from the left, the level 1, 2, & 3 configuration of the lights are turned on. Level 1, 2, & 3 activate the LightAlert if supplied. These default settings can be altered using the Siren Configuration Software. The 3-Level switch may be overridden by other push-buttons. If the push-buttons are programmed to a higher level than the position of the 3-Level switch, the push-buttons will take precedence. If the push-buttons are programmed to a lower level than the position of the 3-Level switch, the 3-Level switch will take precedence. The lighting can be set to various levels for the WAIL, YELP, ALT TONE, MANUAL, and AUX push-buttons. Visit these sections in the configuration software to set these preferences.

3-Color Status LED - Three LEDs are visible on the front of the remote siren amplifier. When the 3-Level switch is set to Level 1 the green LED lights. When the siren is set to Level 2 both the green and yellow LEDs light. When the siren is set to Level 3 the green, yellow, and red LEDs light. These LEDs indicate the level of the siren and controls. These Levels are configurable in the Siren Configuration Software User Manual.

Hands-Free - Hands-Free mode is directly linked to the Auxiliary push-buttons. By default, the Hands-Free mode is disabled. When an Auxiliary push-button is configured for Hands-Free and that Auxiliary push-button has been turned on, the Hands-Free mode is active but waiting for an initial press of the horn ring to activate the WAIL push-button. A second press of the horn ring will activate the YELP push-button. Pressing the horn ring a third time will activate the ALT TONE push-button. A fourth press of the horn ring will return to the WAIL push-button. This type of scrolling will continue until the user deactivates the Hands-Free Scroll. Pressing the Auxiliary push-button turns off the sound and deactivates the Hands-Free Scroll. Pressing and holding the horn ring will turn off the sound but leave Hands-Free Scroll in the active mode. The Remote input and Manual push-button can also be configured for multiple functions during Hands-Free mode. Please refer to Z3 Siren Configuration Manual for details. See Table on page 6 for factory settings.

Horn Ring - The siren accepts either a positive or a ground signal into the Horn Ring input on the Amplifier. The Horn Ring signal is disconnected from the vehicle and connected to the Horn Ring input of the Amplifier. The Horn Relay wire is then run from the Amplifier to the horn of the vehicle. This allows the Horn Ring to execute some of the user selectable functions of the Siren. The Horn Ring can be configured to multiple functions in the Siren Active and Siren Inactive modes of operation. The Horn Ring is set to Scroll in the Hands-Free mode and cannot be changed. Please see the Siren Configuration Software User's Manual for details.

Horn Ring Transfer - The Horn Ring Transfer allows the Horn Ring to be disabled from the vehicle horn and the controls transferred to control other siren tones. The Horn Ring Transfer can be set to occur at Level 1, Level 2, Level 3, or any combination of the three.

Remote - The siren accepts either a positive or a ground signal into the Remote Input wire on the Amplifier. This Remote Input wire is usually connected to a user supplied switch. The siren is factory set for a ground signal. The Remote input can be configured to multiple functions in the Siren Active, Siren Inactive, and Hands-Free modes of operation. Please refer to the Siren Configuration Software User's Manual for details. See Table on page 6 for factory settings.

Hit-N-Go - Hit-N-Go only works when a siren tone is active. Once a siren tone is active, Hit-N-Go is activated simply by pressing the Horn Ring (Vehicle Horn Control) or pressing the Remote input. It will go to the Override tone for 8 seconds and then return to the primary tone. The actual tone for the Hit-N-Go depends on which push-button is active. If the WAIL push-button is active then the Hit-N-Go (Override) tone is the Yelp tone. If the YELP push-button is active then the Hit-N-Go tone is the Hyper-Yelp 1 tone, and if the ALT TONE push-button is active then the Hit-N-Go tone is the Hyper-Lo 1 tone. These Override tones are user configurable in the Configuration Software. The siren can also be configured so the MANUAL push-button is Hit-N-Go activator.

Scroll - Scroll only works when a siren tone is active. Once a siren tone is active, Scroll is activated simply by pressing the Horn Ring (Vehicle Horn Control) or pressing the Remote input. The Scroll Mode will cause the siren to cycle through the WAIL, YELP and ALT TONE push-buttons. For example, if the WAIL push-button is active and the Horn Ring (configured to scroll) is pressed, the YELP push-button will become active. Another press of the Horn Ring will activate the ALT TONE push-button. Another press of the Horn Ring will return to activate the original WAIL push-button. The siren can also be configured so the MANUAL push-button activates the Scroll. NOTE: Pressing and holding the Horn Ring for more than a half second will cause the Siren to generate the Air Horn tone.

Scroll On/Off - The Scroll On/Off mode works like the Scroll mode except the Siren will scroll the primary tones through an off state. The Siren will scroll from Wail to Yelp to Alt Tone to off and then back to Wail. The Remote input can be configured to activate Scroll On/Off. NOTE: Pressing

and holding the Horn Ring for more than a half second will cause the Siren to generate the Air Horn tone.

Load Management - The Load Manager allows setup of three Dropout Voltage Groups by selecting which output to drop out when the vehicle power levels fall below the specified voltage for that group. The default is for no groups to drop out for any reason. See the Siren Configuration Software User Manual for configuration details.

LoadMGR™ - This output can control the power supplied to other loads in the vehicle. The power to these loads can be turned off when the driver turns off the vehicle or the voltage of the battery for the vehicle has dropped below a predetermined voltage level. If the Sleep Mode timer is set to a value other than instant, the LoadMGR will turn off after the Sleep Mode timer has expired (see the definition of Sleep Mode). This output is current limited to 1 amp continuous. Connecting the LoadMGR output to an external relay will allow larger external loads to be controlled. The InterClear® wire is used for the LoadMGR™ function. InterClear® and LoadMGR™ cannot function simultaneously.

Park Kill - By default, Park Kill puts the siren tones in standby and drops out the Level 3 lighting. Park Kill occurs when the vehicle is shifted into park. Once Park Kill is activated, the siren tones are in standby. The siren tones will remain in standby until the vehicle is shifted into drive and an action occurs such as pressing one of the Control Head push-buttons, changing the position of the 3-Level Switch, or keying the microphone. There are multiple options that can be configured in the configuration software.

The Level 3A and siren tones are in standby during Park Kill, and the Auxiliary buttons are not affected by the Park Kill function by default. See the Siren Configuration Software manual for details. The default for the polarity of the Park Kill input is ground (configurable to positive voltage). If the Park Kill input is switched to ground by shifting into park, it will activate the Park Kill functions.

InterClear® - Connect to the device or circuit that is to be activated by the InterClear® feature. The InterClear® circuit supplies power to the InterClear® wire, and it is internally current limited at 1 Amp. Power is supplied to the InterClear® wire when Hit-N-Go is activated. Power is also supplied to this wire when the Manual Wail or Wail Stop functions are activated.

EU Lock - This function is to meet the requirements of some European Union countries to verify that the Warning Lights for the emergency vehicle are actually operational before allowing the siren to generate tones. This is normally configured to be disabled in the Siren Configuration Software. It can be enabled during configuration of the siren. This feature requires user provided current sense module for the lights.

SirenLock - By default, the SirenLock feature is disabled. With SirenLock disabled, the Siren will be in a "Siren Active" mode of operation, and this will disable the "Siren Inactive Function" for the Horn Ring input, Remote input, and Manual push-button. In the Siren Configuration Software, the SirenLock can be changed to allow siren tones when in Level 1, Level 2, and/or in Level 3. Air Horn, Radio Rebroadcast, Manual, and Public Address are unaffected by this feature.

LightAlert - By default, the LightAlert feature will produce an audible "beep" on a periodic basis if any lighting is activated including Auxiliary and ArrowStik push-buttons. This is intended to alert the operator that lights are on. The Siren Configuration Software allows this feature to be disabled for selected functions.

Sleep Mode - This is by default set to instantly turn off the Siren system when the vehicle ignition is turned off. This can also be set in the configuration software to turn off after 10, 20, or 30 minutes.

Not Configurable

Alarm - This is an input that senses a +12VDC signal even when ignition is turned off. Connect the wire labeled ALARM to a circuit that can supply a +12VDC signal when activated. When a +12VDC signal is seen on this input, a repetitive alarm will sound on the output speakers continuously until the +12VDC signal is removed. For example, this can be used to alarm the police officer when a temperature sensor on a K-9 unit has reached dangerous levels. The alarm will continue until the temperature sensor has returned to safe levels.

Automatic Short Circuit Protection - The siren will sense a short circuit on the speaker terminals and automatically go to standby until the fault is removed. Once the fault is removed, the siren will return to normal operation.

Instant-On - There is no "ON/OFF" switch. Selecting any siren function, or keying the microphone will activate the selected siren function, assuming the siren is properly installed and the vehicle's ignition is switched on.

Microphone - Pressing the push-button on the microphone will automatically override the current mode of the siren tones and switches to public address mode. Push-To-Talk (PTT) is highest priority and overrides all other siren tones. The microphone is easily plugged into the Control Head with a modular phone plug. This allows the microphone to be unplugged for service or replacement.

"Stuck Mic" - When the PTT push-button is pressed, the siren will disable the PTT after 30 seconds of being held. The siren will return to its previous condition even though the push-button is still being held in the on position. This will avoid the situation where the PTT push-button is "stuck" in the on position for extended periods. To continue using the PTT simply release the PTT push-button and press it again.

FACTORY SETTINGS

	Setting 1	Setting 2	Setting 3	Setting 4	Setting 5	Setting 6
3-Level Switch	Function = Progressive					
Level 1	Function Enabled	Horn Ring Transfer = Not Activated	Activate ArrowStik = None	Activate Auxiliary Switch = None		
Level 2	Function Enabled	Horn Ring Transfer = Activated	Activate ArrowStik = None	Activate Auxiliary Switch = None		
Level 3	Function Enabled	Horn Ring Transfer = Activated	Activate ArrowStik = None	Activate Auxiliary Switch = None		
ArrowStik	Conventional ArrowStik = None					
LEFT	Function Enabled					
CENTER	Function Enabled					
RIGHT	Function Enabled					
FLASH	Function Enabled					
DIM	No Configuration Available					
Horn Ring	Enable = With Horn Ring Transfer	Siren Active = Hit-N-Go	Hands-Free = Scroll	Polarity = Ground	Siren Inactive = None	
Park Kill	3-Level Switch Control = Level 3A Standby	Siren Control = Siren Standby	Auxiliary Switch Control = No Impact	Polarity = Ground		
LightAlert	3-Level Switch = All	Auxiliary Switches = All	ArrowStik = All			
Sleep Mode	Sleep Mode = Instant					
CA T13	CA T13 = Disabled					
Remote	Enable = With Horn Ring Transfer	Siren Active = Hit-N-Go	Hands-Free = None	Polarity = Ground	Siren Inactive = None	EU Lock = Disabled
Load Management						
Group 1	Voltage Fault Threshold = 11.50 Volts	Dropout Delay = 1 Minute	3-Level Switch = Off	Auxiliary Push-Buttons = Off	ArrowStik = Off	LoadMGR = Off
Group 2	Voltage Fault Threshold = 11.00 Volts	Dropout Delay = 1 Minute	3-Level Switch = Off	Auxiliary Push-Buttons = Off	ArrowStik = Off	LoadMGR = Off
Group 3	Voltage Fault Threshold = 10.50 Volts	Dropout Delay = 1 Minute	3-Level Switch = Off	Auxiliary Push-Buttons = Off	ArrowStik = Off	LoadMGR = Off
Overvoltage Protection	Enabled					
SirenLock	Function Disabled					
Other Push-Button Settings						
WAIL	Primary Tone = Wail	Override Tone = Yelp	Activates = No Aux	Level 3 (Red)		
YELP	Primary Tone = Yelp	Override Tone = Hyper-Yelp 1	Activates = No Aux	Level 3 (Red)		
ALT TONE	Primary Tone = Hi-Lo 1	Override Tone = Hyper-Lo 1	Activates = No Aux	Level 3 (Red)		
MANUAL	Siren Active = Manual Wail	Hands-Free = Manual Wail	Siren Inactive = Manual Wail, No AUX Activated, Level 3 (Red)			
AIR HORN	Enable = Always Enabled	Primary Tone = Air Horn 1				
AUX A	Function Enabled	Function = Toggle On/Off	Activates = Aux A			
AUX B	Function Enabled	Function = Toggle On/Off	Activates = Aux B			
AUX C	Function Enabled	Function = Toggle On/Off	Activates = Aux C			
AUX D	Function Enabled	Function = Toggle On/Off	Activates = Aux D			
AUX E	Function Enabled	Function = Toggle On/Off	Activates = Aux E			
AUX F	Function Enabled	Function = Toggle On/Off	Activates = Aux F			
AUX G	Function Enabled	Function = 8 Sec Timed	Activates = Aux G	Polarity = Positive		
AUX H	Function Enabled	Function = Toggle On/Off	Activates = Aux H	Polarity = Positive		

Unpacking & Pre-installation

After unpacking your Siren, carefully inspect the unit and associated parts for any damage that may have been caused in transit. Report any damage to the carrier immediately.

Verify all components have been delivered. The box should contain the Siren Control Head, Amplifier, cable/harness bag, microphone, hardware bag, legend set and user manuals bag.

Installation & Mounting

The Siren Control Head is made to mount directly in the console of most leading manufacturers as seen in Fig. 3 shown below. It may also be

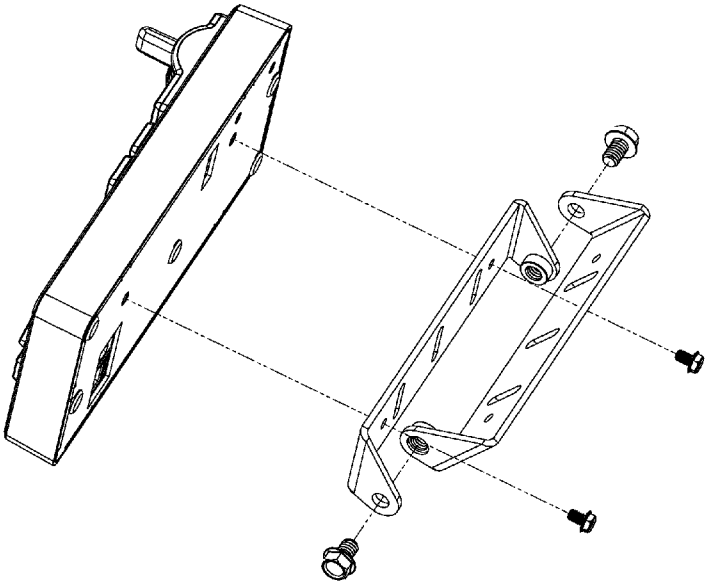


Figure 2

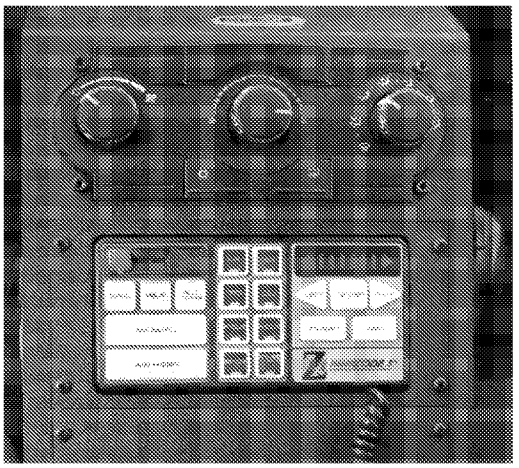


Figure 3

mounted above the dash, below the dash or on the transmission tunnel using the mounting hardware supplied (see Fig. 2 above). Also reference page 15 and 16 for description of components and Code 3 part numbers. Ease of operation and convenience to the operator should be the prime consideration when mounting the siren and controls. When choosing a mounting location the user must consider the deployment area for the air bag of the vehicle and other factors which might impact the safety of the vehicle occupants.

NOTE: Setups and adjustments will be made in steps that may require access to the rear area of the unit. Plan the installation and wiring accordingly.

WARNING

All devices should be mounted in accordance with the manufacturer's instructions and securely fastened to vehicle elements of sufficient strength to withstand the forces applied to the device. Ease of operation and convenience to the operator should be the prime consideration when mounting the siren and controls. Adjust the mounting angle to allow maximum operator visibility. Do not mount the Control Head Module in a location that will obstruct the drivers view. Mount the microphone clip in a convenient location to allow the operator easy access. Devices should be mounted only in locations that conform to their SAE identification code as described in SAE Standard J1849. For example, electronics designed for interior mounting should not be placed underhood, etc. Controls should be placed within convenient reach* of the driver or if intended for two person operation the driver and/or passenger. In some vehicles, multiple control switches and/or using methods such as "horn ring transfer" which utilizes the vehicle horn switch to toggle between siren tones may be necessary for convenient operation from two positions.

**Convenient reach is defined as the ability of the operator of the siren system to manipulate the controls from their normal driving/riding position without excessive movement away from the seat back or loss of eye contact with the roadway.*

Amplifier Connections

All Amplifier connections are made on one side of the Amplifier as seen in figure 4. See wiring diagram on page 13. All Amplifier connections are quick disconnect requiring no tools.

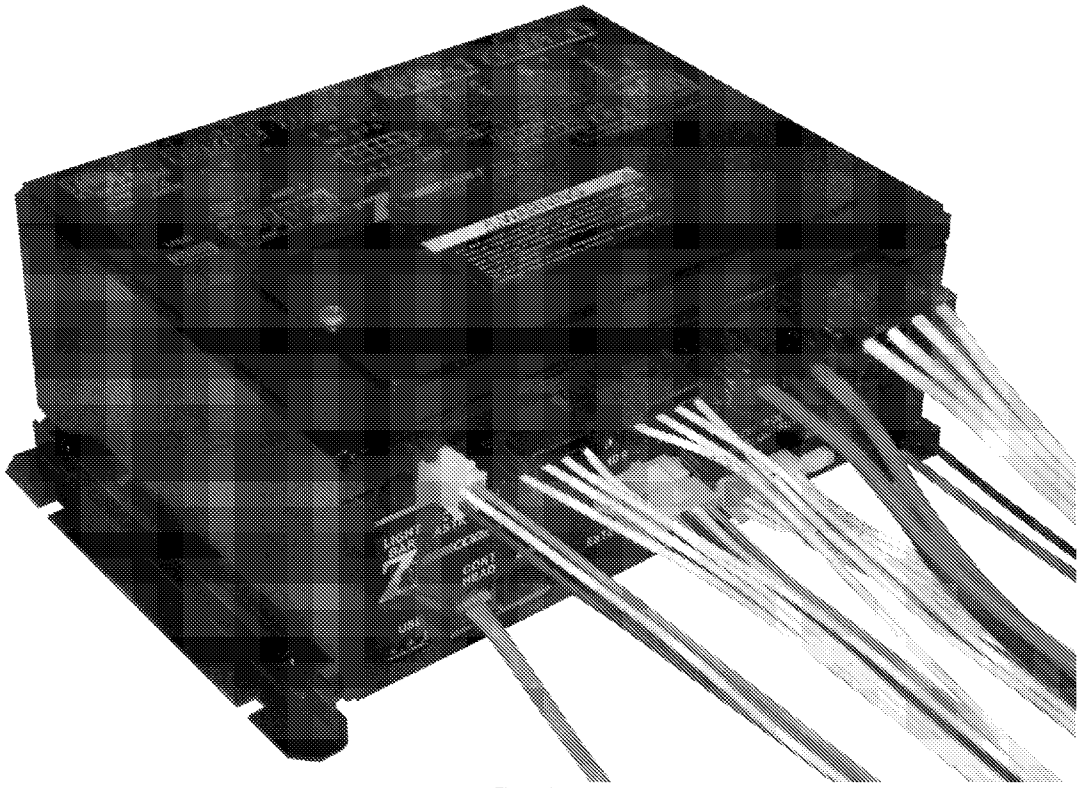


Figure 4

WARNING

Larger wires and tight connections will provide longer service life for components. For high current wires it is highly recommended that terminal blocks or soldered connections be used with shrink tubing to protect the connections. Do not use insulation displacement connectors (e.g. 3M® Scotchlock type connectors). Route wiring using grommets and sealant when passing through compartment walls. Minimize the number of splices to reduce voltage drop. High ambient temperatures (e.g. under-hood) will significantly reduce the current carrying capacity of wires, fuses, and circuit breakers. Use "SXL" type wire in engine compartment. All wiring should conform to the minimum wire size and other recommendations of the manufacturer and be protected from moving parts and hot surfaces. Looms, grommets, cable ties, and similar installation hardware should be used to anchor and protect all wiring.

Particular attention should be paid to the location and method of making electrical connections and splices to protect these points from corrosion and loss of conductivity. Ground terminations should only be made to substantial chassis components, preferably directly to the vehicle battery.

The user should install a fuse sized to approximately 125% of the maximum Amp capacity in the supply line and each switched circuit to protect against short circuits. For example, a 30 Amp fuse should carry a maximum of 24 Amps. DO NOT USE 1/4" DIAMETER GLASS FUSES AS THEY ARE NOT SUITABLE FOR CONTINUOUS DUTY IN SIZES ABOVE 15 AMPS. Circuit breakers are very sensitive to high temperatures and will "false trip" when mounted in hot environments or operated close to their capacity. Fuses or circuit breakers should be located as close to the power takeoff points as possible and properly sized to protect the wiring and devices.

WARNING Connection of a 58 watt speaker to the siren amplifier will cause the speaker to burn out, and will void the speaker warranty!

Amplifier Power Distribution

The Level 1, 2, 3A and 3B outputs can supply a maximum of 15 Amps each or a combined total of 50 Amps. Each Level has a 20 Amp fuse installed inside the Amplifier. Fuses may be accessed through the panel on top of the Amplifier.

The Auxiliary outputs A, B, C and D can supply a maximum of 5 amps each. Auxiliary outputs E, F, G and H can supply a maximum of 10 amps each. The combined total for all Auxiliary outputs is 50 Amps. Auxiliary outputs A, B, C and D have 7.5 amp fuses and Auxiliary outputs E, F, G and H have 15 amp fuses. Fuses may be accessed through the panel on top of the Amplifier.

WARNING Any electronic device may create or be affected by electromagnetic interference. After installation of any electronic device, operate all equipment simultaneously to insure that operation is free of interference.

Control Head Connections

The connection from the Control Head to the remote Amplifier is made using a standard CAT-5 cable (P/N T56649) connected to the port labeled SIREN AMP on the back of the Control Head. This cable is found in the Harness & Cable Bag P/N T56641. See figure 5 below.

In addition, the microphone P/N T11856 connects to the Control Head port labeled PA MIC. The microphone also uses a Microphone Hanger Bracket (P/N T00631) that mounts to the dash of the vehicle.

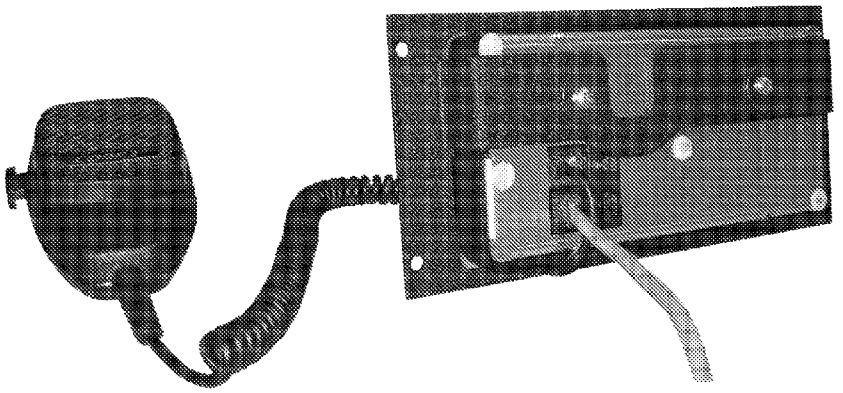


Figure 5

WARNING Utilizing non-factory specified screws and/or mounting brackets and/or the improper number of screws may result in failure of the mounting system and severe damage to the vehicle as well as loss of warranty coverage on the equipment.

Conventional ArrowStik Connections

CC ArrowStik Connection

The Siren can connect directly to any Code 3 Centrally Controlled (CC) Lightbar ArrowStik and some non-Code3 CC Lightbar ArrowStiks using Code 3 harness P/N T56629 (see figure 8). This harness is found in the Harness & Cable Bag P/N T56641. Refer to the wiring diagram on page 13.

Conventional ArrowStik Connection

The Siren can also connect directly to a conventional ArrowStik or both at the same time using Code 3 harness P/N T56631 (see figures 6 & 7). Refer to the wiring diagram on page 13. If a conventional ArrowStik is desired see the Siren Configuration Software Manual for details regarding flash pattern selection.

The 9 wire harness can be connected to drive an 8, 6, or 5 head ArrowStik. The Siren is compatible with some non-Code 3 ArrowStik products. The Siren conventional ArrowStik outputs provide a current sink (ground) signal when active. Each output is rated for an absolute maximum of 5 amps. See the wiring diagram on page 13 and the install manual for your ArrowStik product for wiring details.

8 HEAD HARNESS CONNECTIONS
When viewing the vehicle from the rear, the ArrowStik harness is connected in the following order from Driver side to Passenger side: Blue, Yellow, Gray, Green, Violet, Tan, Orange, Brown. The Right Arrow travels from Blue to Brown. The Left Arrow travels from Brown to Blue.

6 HEAD HARNESS CONNECTIONS
When viewing the vehicle from the rear, the ArrowStik harness is connected in the following order from Driver side to Passenger side: Yellow, Gray, Green, Violet, Tan, Orange. The Right Arrow travels from Yellow to Orange. The Left Arrow travels from Orange to Yellow.

If the Siren ArrowStik function is configured for ArrowStik End Flash, the Blue and Brown wires will attach to the two end light heads.

5 HEAD HARNESS CONNECTIONS
When viewing the vehicle from the rear, the ArrowStik harness is connected in the following order from Driver side to Passenger side: Yellow, Gray, Violet, Tan, Orange. The Right Arrow travels from Yellow to Orange. The Left Arrow travels from Orange to Yellow.

If the Siren ArrowStik function is configured for ArrowStik End Flash, the Blue and Brown wires will attach to the two end light heads.

DIM Control
The Siren DIM function supplies +12VDC output when active. This output is compatible with the dimming input of older Code 3 ArrowStik products. It is not used with newer Code 3 ArrowStik products. This output can supply an absolute maximum of 1.5 amps.

Programming

The Siren will come from the factory set to control a CC ArrowStik. For details about ArrowStik pattern selection for Code 3 CC Lightbars, refer to the Lightbar user manual. For an conventional ArrowStik, refer to the Siren Configuration Software Manual.

NON-CC WIRING CONNECTIONS

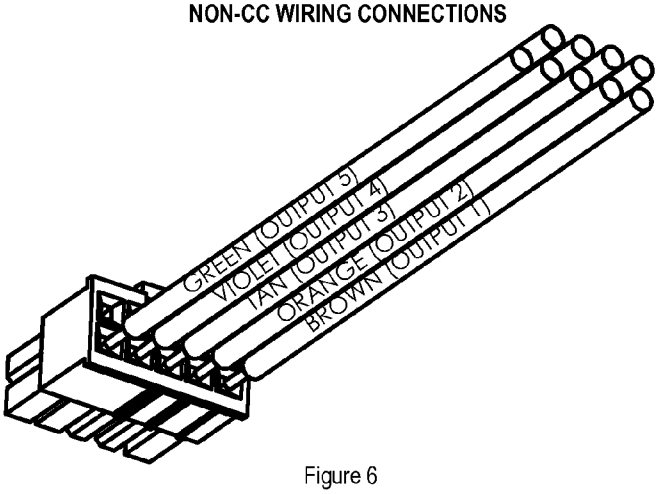


Figure 6

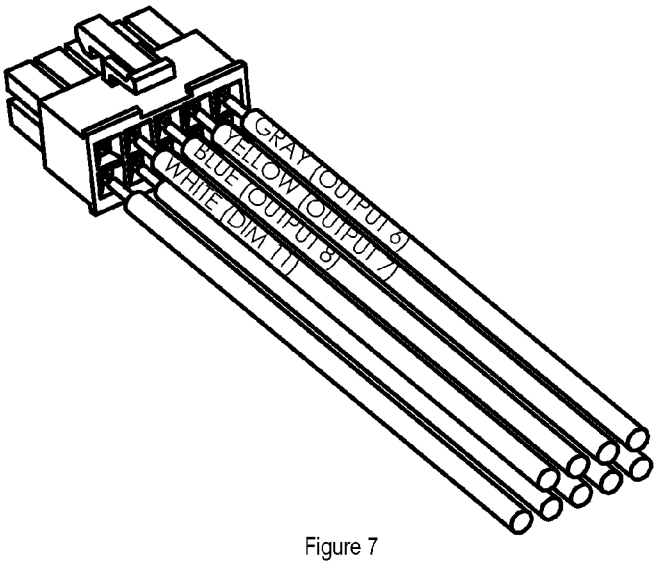


Figure 7

CC WIRING CONNECTION

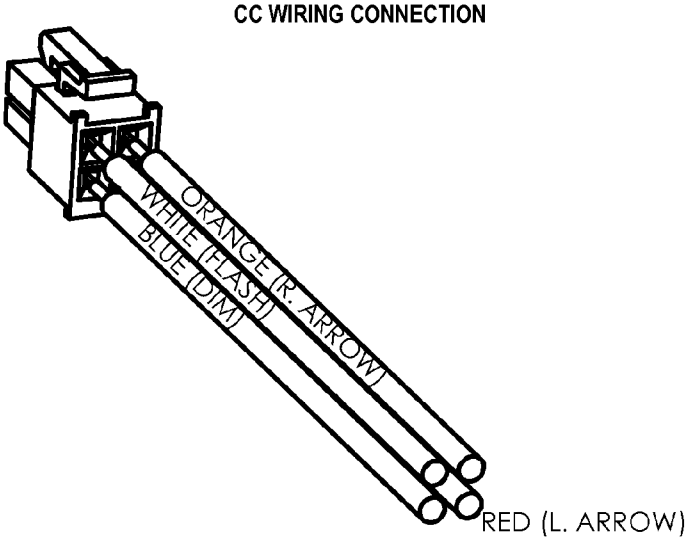


Figure 8

Troubleshooting

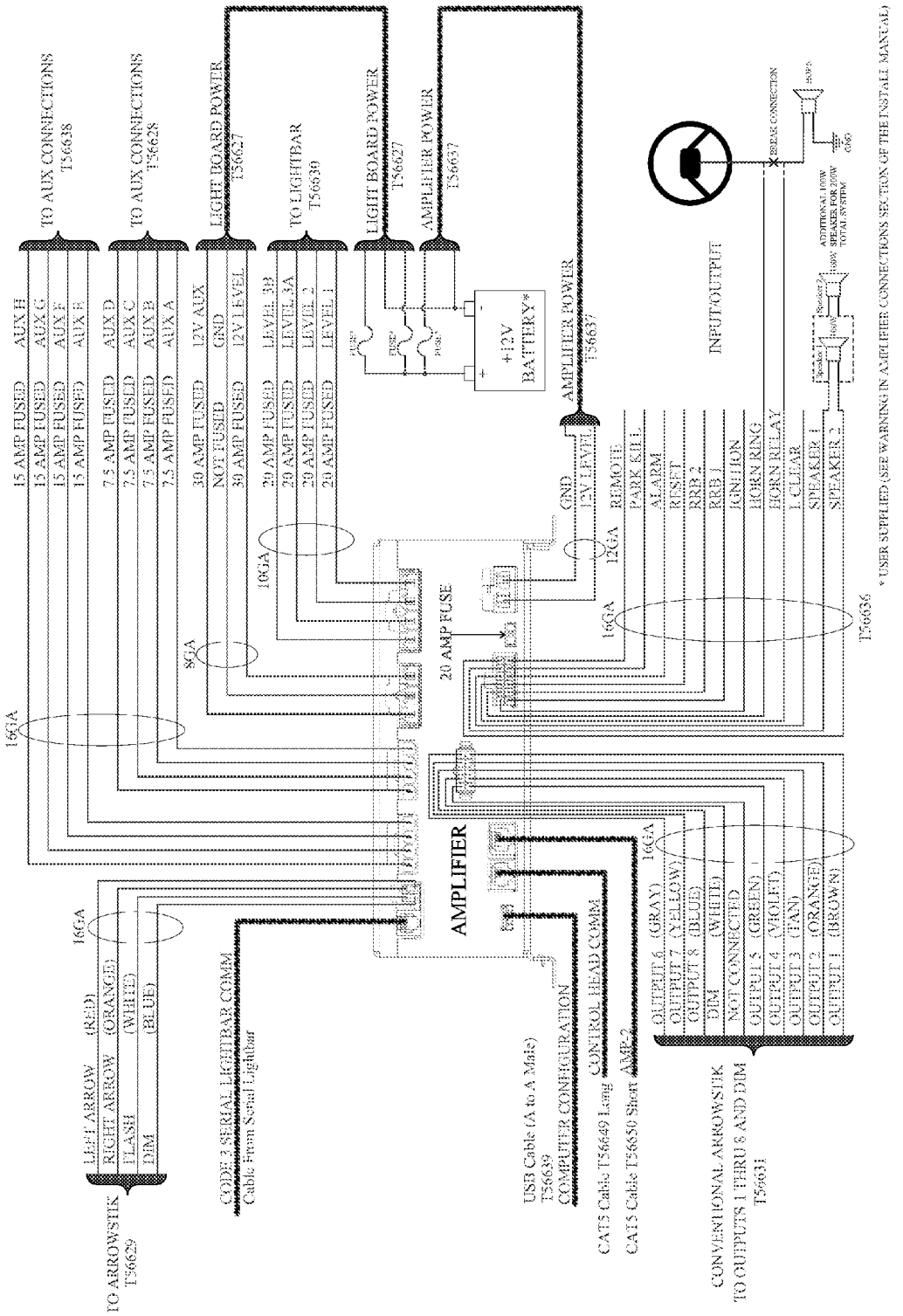
(Refer to wiring diagram on page 13.)

PROBLEM	PROBABLE CAUSE	REMEDY
NO SIREN OUTPUT	A. PARK KILL ACTIVATED B. SIRENLOCK ENGAGED C. SHORTED SPEAKER OR SPEAKER WIRES. SIREN IN OVER CURRENT PROTECTION MODE. D. OVERVOLTAGE > 15V	A. SHIFT VEHICLE OUT OF PARK. B. SELECT PROPER SIRENLOCK LEVEL. C. CHECK CONNECTIONS D. CHECK VEHICLE BATTERY
EXTERNAL 20A FUSE BLOWS	A. AMPLIFIER POWER WIRES REVERSED POLARITY	A. CHECK POLARITY B. REPLACE SPEAKER(S)
NO OUTPUT FROM SPEAKER, TONES HEARD INSIDE AMPLIFIER MODULE	A. SPEAKER NOT CONNECTED/ OPEN CIRCUIT IN SPEAKER WIRING B. DEFECTIVE SPEAKERS	A. CHECK SPEAKER WIRING B. REPLACE SPEAKER(S)
SIREN TONES VOLUME TOO LOW/GARBLED	A. LOW VOLTAGE TO SIREN AMPLIFIER B. HIGH RESISTANCE IN WIRING/DEFECTIVE SPEAKER C. SPEAKERS PHASED IMPROPERLY	A. CHECK WIRING FOR BAD CONNECTIONS/CHECK VEHICLE CHARGING SYSTEM. B. CHECK SPEAKER(S) WIRING/REPLACE SPEAKER(S). C. REFER TO PAGE 3 FOR PROPER PHASING (200W OPTION)
HIGH RATE OF SPEAKER FAILURE	A. HIGH VOLTAGE TO SIREN B. 58 WATT SPEAKER CONNECTED TO 100 WATT TAP. 58 WATT NOT ALLOWED.	A. CHECK VEHICLE CHARGING SYSTEM. B. USE CORRECT SPEAKER.
SIREN CONTINUES TO OPERATE FOR 7 SECONDS AFTER MANUAL BUTTON/HORN RING IS RELEASED	A. "HIT-N-GO' FEATURE ENGAGED. NORMAL OPERATION	
INTERCLEAR WILL NOT POWER AUXILIARY DEVICES	A. THERE IS A SHORT IN THE WIRING, OR THE LOAD IS GREATER THAN 1 AMP.	A. CHECK FOR SHORTS. INSTALL INTERCLEAR BOOSTER KIT (PART #INTBS)
P. A. VOLUME LOW OR NO P. A. AT ALL.	A. INCREASE P.A. VOLUME. B. MICROPHONE NOT COMPLETELY PLUGGED IN. C. DEFECTIVE MICROPHONE D. COMMON MICROPHONE CIRCUIT NOT PROPERLY WIRED. E. INCORRECT MICROPHONE.	A. REFER TO SETUP AND ADJUSTMENT SECTION B. PLUG MICROPHONE IN SECURELY C. REPLACE MICROPHONE D. CHECK WIRING E. CALL CODE 3 FOR LIST OF ADAPTABLE MICROPHONES.
RRB VOLUME LOW, OR NO RRB AT ALL.	A. INCREASE RADIO REBROADCAST VOLUME. B. RRB WIRES NOT CONNECTED TO TWO-WAY RADIO EXTERNAL SPEAKER.	A. REFER TO SETUP AND ADJUSTMENT SECTION. B. CHECK RRB CONNECTIONS.
SIREN SOUNDS BY ITSELF	A. REMOTE SWITCH (HORN RING) WIRING FROM TERMINAL REMOTE SHORTING TO POSITIVE OR TO GROUND (EARTH).	A. CHECK WIRING FOR ANY SHORTING.
SIREN RUNS PROPERLY BUT SHUTS DOWN WHILE RUNNING, THEN STARTS RUNNING AGAIN AFTER A FEW MINUTES.	A. VEHICLE CIRCUIT BREAKERS NOT RATED PROPERLY, AND ARE OVERHEATING, OR ARE NOT FUNCTIONING PROPERLY.	A. REFER TO SPECIFICATIONS SECTION, PAGE 17. USE A BREAKER RATED AT 1.25 TIMES THE AMPERAGE OF THE EXPECTED LOAD CURRENT.
WHEN POWERED THERE IS A 5 SECOND PAUSE AND THEN A FLASH AND BEEP EVERY 2 SECONDS CONTINUOUSLY WITHOUT STOPPING.	A. CONTROL HEAD HAS FAILED TO COMMUNICATE WITH THE AMPLIFIER. B. CONFIGURATION LOAD FAILURE.	A. CHECK CONNECTION OF CAT-5 CABLE FROM CONTROL HEAD TO AMPLIFIER. B. RESET POWER. C. RELOAD AMPLIFIER CONFIGURATION. D. CONTACT CUSTOMER SERVICE.

Troubleshooting Continued

(Refer to wiring diagram on page 13.)

PROBLEM	PROBABLE CAUSE	REMEDY
THE GREEN, AMBER, AND/OR RED LEDS FLASH RAPIDLY AND CONTINUOUSLY.	A. ONE OR MORE OF THE 3-LEVEL FUSES HAVE BLOWN IN THE AMPLIFIER. B. 12V IS NOT BEING SUPPLIED TO THE 12V 3L INPUT. C. LEVEL OUTPUT SHORTED	A. REPLACE THE FUSE(S) IN THE AMPLIFIER. B. CHECK INPUT POWER CONNECTION. C. CHECK CONNECTION TO LOAD
ANY OF THE ACTIVE AUX A-F PUSHBUTTONS FLASH RAPIDLY AND CONTINUOUSLY.	A. ONE OR MORE OF THE AUX A-F FUSES HAVE BLOWN IN THE AMPLIFIER. B. 12V IS NOT BEING SUPPLIED TO THE AUX A-F OUTPUTS.	A. REPLACE THE FUSE(S) IN THE AMPLIFIER. B. CHECK HARNESS CONNECTION BETWEEN THE AMPLIFIER AND THE AUXILIARY DEVICES.
IF IN LEVEL 3 AND THE VEHICLE IS IN PARK, THE RED LEVEL INDICATOR ON THE CONTROL HEAD IS BLINKING AT A SLOW RATE.	A. THIS IS NORMAL. THIS IS COMMUNICATING THAT THE LEVEL 3A OR THE LEVEL 3B LIGHTS ARE IN STANDBY (TURNED OFF). B. LOAD MANAGER HAS SENSED LOW INPUT AND TURNED OFF 3A OR 3B.	A. PUT THE VEHICLE BACK INTO DRIVE. B. CHECK VEHICLE BATTERY VOLTAGE.
PA ONLY FUNCTIONS FOR 30 SECONDS BEFORE TURNING OFF.	A. THIS IS NORMAL. THE PA IS TURNED OFF AFTER 30 SECONDS TO AVOID THE STUCK MIC POSSIBILITY.	A. SIMPLY RELEASE THE PTT BUTTON AND PRESS AGAIN FOR ANOTHER 30 SECONDS OF BROADCAST ABILITY.
RRB SHUTS OFF AFTER EXTENDED USE.	A. THIS IS NORMAL. THE RRB SHUTS OFF AFTER AN EXTENDED PERIOD WHEN THE EQUIPMENT STARTS TO OVERHEAT. THIS IS TO AVOID DAMAGE TO THE COMPONENTS IN THE AMPLIFIER.	A. ALLOW THE AMPLIFIER A FEW MINUTES TO COOL DOWN.


Z Siren Wiring Diagram
TO AUX CONNECTIONS T56638
TO AUX CONNECTIONS T56628
LIGHT BOARD POWER T56627
TO LIGHTBAR T56639
LIGHT BOARD POWER T56627
AMPLIFIER POWER T56637
15 AMP FUSED AUX H
15 AMP FUSED AUX G
15 AMP FUSED AUX F
15 AMP FUSED AUX E
7.5 AMP FUSED AUX D
7.5 AMP FUSED AUX C
7.5 AMP FUSED AUX B
7.5 AMP FUSED AUX A
30 AMP FUSED 12V AUX
NOT FUSED GND
30 AMP FUSED 12V LEVEL
20 AMP FUSED LEVEL 3B
20 AMP FUSED LEVEL 3A
20 AMP FUSED LEVEL 2
20 AMP FUSED LEVEL 1
16GA
8GA
20 AMP FUSE
+12V BATTERY*
AMPLIFIER POWER T56637
GND
12V LEVEL
12GA
REMOTE
PARK KILL
ALARM
RESET
RRB 2
RRB 1
IGNITION
HORN RING
HORN RELAY
L CLEAR
SPEAKER 1
SPEAKER 2
INPUT/OUTPUT
BREAK CONNECTION
ADDITIONAL 100W SPEAKER FOR 200W TOTAL SYSTEM
T56636
* USER SUPPLIED (SEE WARNING IN AMPLIFIER CONNECTIONS SECTION OF THE INSTALL MANUAL)
AMPLIFIER
OUTPUT 6 (GRAY)
OUTPUT 7 (YELLOW)
OUTPUT 8 (BLUE)
DIM (WHITE)
NOT CONNECTED
OUTPUT 5 (GREEN)
OUTPUT 4 (VIOLET)
OUTPUT 3 (TAN)
OUTPUT 2 (ORANGE)
OUTPUT 1 (BROWN)
CONVENTIONAL ARROWSTIK
TO OUTPUTS 1 THRU 8 AND DIM
T56631
USB Cable (A to A Male)
T56639
COMPUTER CONFIGURATION
CONTROL HEAD COMM
CAT5 Cable T56649 Long
AMP-2
CAT5 Cable T56650 Short
TO ARROWSTIK T56629
LEFT ARROW (RED)
RIGHT ARROW (ORANGE)
FLASH (WHITE)
DIM (BLUE)
CODE 3 SERIAL LIGHTBAR COMM
Cable From Serial Lightbar

Siren Specifications

Siren Section:

Input Voltage	10 to 16 VDC and ground - 12V units (Note: Operation of 12V units above 15 VDC for an extended period of time may result in speaker damage.)
Operating Current	100W: 8 Amps @ 13.6V with 11-ohm load (100 Watt Speaker) - 12V units 200W: 14 Amps @ 13.6V with 5.5-ohm load (2-100 Watt Speakers) - 12V units

(NOTE: There is no 58 Watt speaker connection available.)

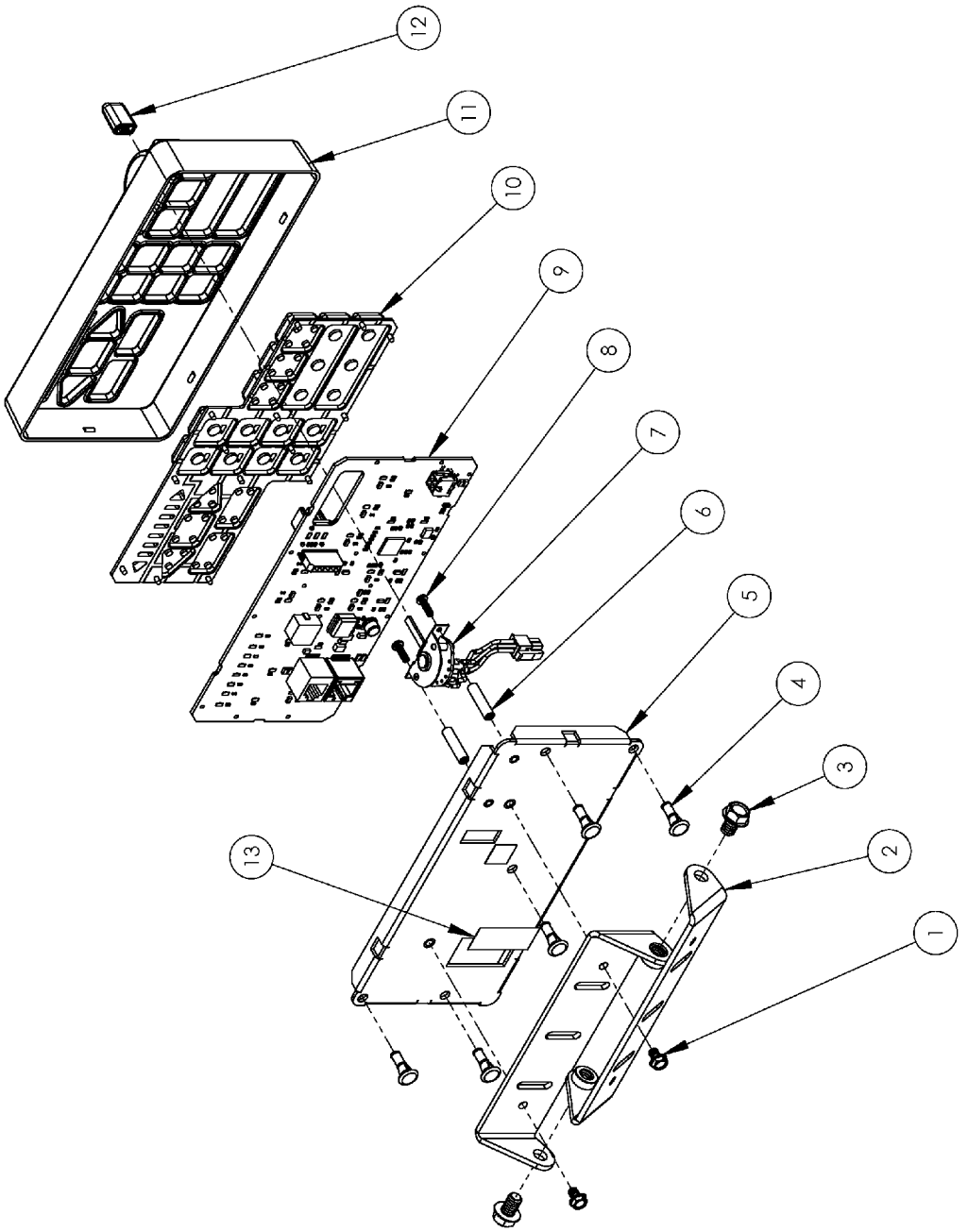
Standby Current	Ignition On < 10mA Ignition Off < 1mA
Cycle Rate	Wail - 11 cycles/minute Yelp - 200 cycles/minute
Voltage Output	~66 Vpp

Audio Section:

Audio Response	3 dB down points - 500 to 3000 Hz 1000 Hz, 0 dB reference

Lighting Specifications

Warning Light Control:	3-Level Switch, 4 Outputs, 50 Amps. maximum combined total	
Level 1 & 2:	15 Amp Maximum Each Level 25 Amp Maximum Total Green (1) & Yellow (2) LED Indication	
Level 3A & 3B:	15 Amp Maximum Each Level 25 Amp Maximum Total Red (3) LED Indication	
AUX A thru D:	5 Amp Maximum Each Aux 20 Amp Maximum Total	
AUX E thru H:	10 Amp Maximum Each Aux 30 Amp Maximum Total	
ArrowStik:	8 Output (not internally fused), Ground Switching, 5A Per Output DIM Output, +12VDC, 1.5A Internally Protected	
System - Weight:	Amplifier	4.2 lbs (1.9 Kg)
	Control Head & Microphone	1.1 lbs (0.5 Kg)
	Boxed Unit	9.5 lbs (4.3 Kg)
Size:		
	Amplifier	9.750"L x 6.832"W x 3.936"H
	Control Head	6.80"L x 3.30"H x 1.07"D (Switch will increase depth dimension to 1.95"D.)
Temperature:	-22F thru +149F (-30C thru +65C) SAE Equipment Type EVS1	

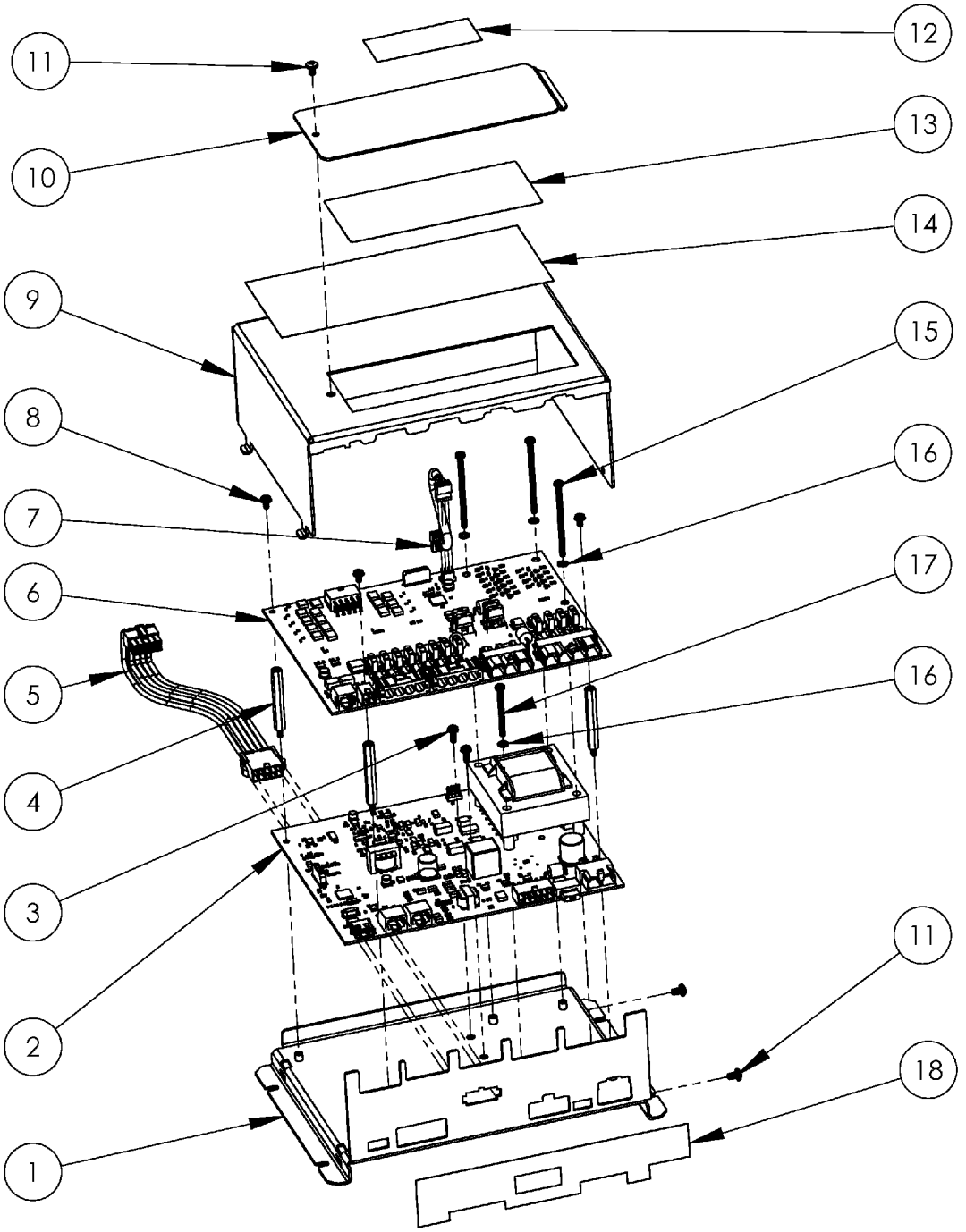


Z Siren Control Head, Exploded View

Siren Control Head, Parts List

Ref No.	Description	Purchasable Part No.	Internal Part No. (Not For Sale)	Qty.
1	8-32 X 1/4" Hex Head MS	T10385		2
2	Control Head Mounting Bracket	T10924		2
3	1/4"-20 X 3/8" Hex Head MS	T10912		2
4	Rev Lock 1/2" Nylon PCB Stdf		T56645	5
5	Sheet Metal Base Plate		T15287	1
6	.187 OD 4-40 Standoff		T10890	2
7	4 Position Switch Assembly	T56634		1
8	4-40 X 3/8" Phil Pan HD		T06937	2
9	Control HD PCB		T11858	1
10	Molded Keypad		T15285	1
11	Molded Control Housing	T15281		1
12	Moulded Switch Knob	T15286		1
13	Part of Amp Box Wiring Label		T11863	1

To order a complete Siren Control Head, order part number S39284M.
(The Siren Control Head will not function without a Siren Amplifier.)
To order a complete Siren Cable & Harness bag, order part number T56641.
To order a complete Siren Manuals & Legends bag, order part number S38284M.



Siren Amplifier, Exploded View

Siren Amplifier, Parts List

Ref No.	Description	Purchasable Part No.	Internal Part No. (Not For Sale)	Qty.
1	Amplifier E Tray	T15305	All Amplifier Components	1
2	Amplifier PCB	T11851	Are Purchasable	1
3	#6-32 X .375" Phil Pan HD MS	T04250		1
4	#6-32 X 1.875" Hex MF Stdoff	T15326		2
5	Outputs & Dim Int Harness	T56632		3
6	Light Board PCB	T11854		1
7	I2C Comm Cable	T56623		1
8	#6-32 X .250 Phil Pan HD MS	T07077		3
9	Amplifier Cover	T15307		1
10	Amplifier Fuse Cover	T15310		1
11	#8-32 X .250 Phil Pan HD TRS	T09751		2
12	Warning Label	T09937		1
13	Wiring Label Fuse Map	T11861		1
14	Wiring Label Amp Box Top	T11863		1
15	#6-32 X 2.250 Phil Pan HD MS	T15328		3
16	Washer, Int Tooth #6	T00150		1
17	#6-32 X 1.500 Phil Pan HD MS	T01332		1
18	Wiring Label, Terminal Side	T11863		1

To order a complete Siren Amplifier, order part number S39285M.
To order a complete Siren Cable & Harness bag, order part number T56641.
To order a complete Siren Manuals & Legends bag, order part number S38284M.

Siren Cables & Harnesses

Ref No.	Description	Purchasable Part No.	Internal Part No. (Not For Sale)	Qty.
1	Light Board Power Harness		T56627	1
2	Aux A-D Harness		T56628	1
3	L/R Arrow, Dim, Flash Harness		T56629	1
4	Level 1, 2, 3A, 3B Harness		T56630	1
5	Outputs & Dim Ext. Harness		T56631	1
6	CAT5 Cable Min 20 FT	T56649		1
7	Input/Output Harness		T56636	1
8	Amplifier Power Harness		T56637	1
9	Aux E-H Harness		T56638	1
10	USB A Male to A Male Cable	T56639		1
11	Mic w/Modular Plug	T11856		1

To order a complete Siren Amplifier, order part number S39285M.
To order a complete Siren Cable & Harness bag, order part number T56641.
To order a complete Siren Manuals & Legends bag, order part number S38284M.

NOTES

NOTES

WARRANTY

Code 3®, Inc.'s emergency devices are tested and found to be operational at the time of manufacture. Provided they are installed and operated in accordance with manufacturer's recommendations, Code 3®, Inc. guarantees all parts and components except the lamps to a period of 1 year, LED Lighthead modules to a period of 5 years (unless otherwise expressed) from the date of purchase or delivery, whichever is later. Units demonstrated to be defective within the warranty period will be repaired or replaced at the factory service center at no cost.

Use of lamp or other electrical load of a wattage higher than installed or recommended by the factory, or use of inappropriate or inadequate wiring or circuit protection causes this warranty to become void. Failure or destruction of the product resulting from abuse or unusual use and/or accidents is not covered by this warranty. Code 3®, Inc. shall in no way be liable for other damages including consequential, indirect or special damages whether loss is due to negligence or breach of warranty.

CODE 3®, INC. MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY INCLUDING, WITHOUT LIMITATION, WARRANTIES OF FITNESS OR MERCHANTABILITY, WITH RESPECT TO THIS PRODUCT.

PRODUCT RETURNS

If a product must be returned for repair or replacement*, please contact our factory to obtain a Return Goods Authorization Number (RGA number) before you ship the product to Code 3®, Inc. Write the RGA number clearly on the package near the mailing label. Be sure you use sufficient packing materials to avoid damage to the product being returned while in transit.

*Code 3®, Inc. reserves the right to repair or replace at its discretion. Code 3®, Inc. assumes no responsibility or liability for expenses incurred for the removal and /or reinstallation of products requiring service and/or repair; nor for the packaging, handling, and shipping; nor for the handling of products returned to sender after the service has been rendered.

Problems or Questions? Call The Technical Assistance HOTLINE - (314) 996-2800

CODE 3®
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www.code3pse.com

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Revision 0, 05/11 - Instruction Book Part No. T56643
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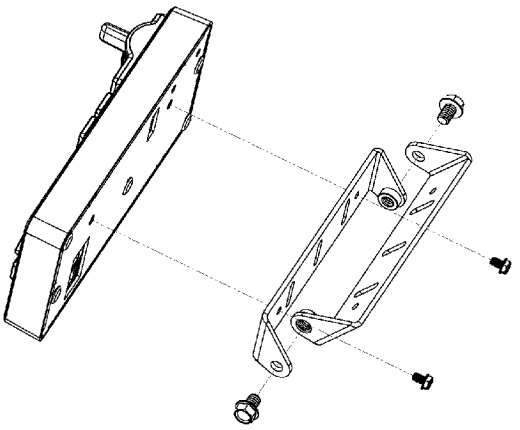
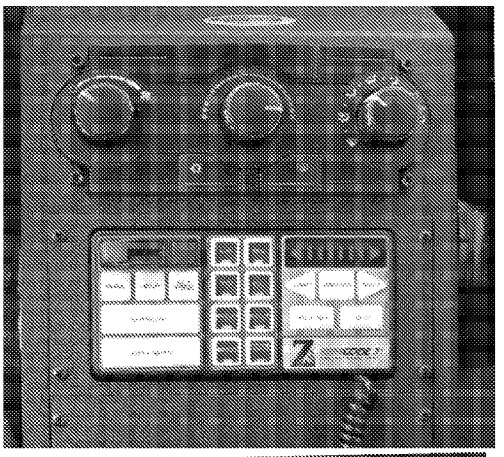
APPENDIX 6

Z Hardware Quick Install Manual

Z Siren Hardware Configuration

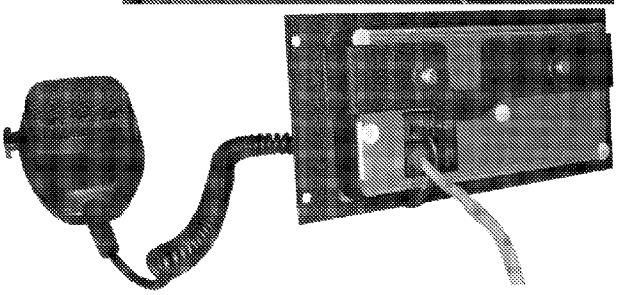
Start by mounting the Control Head to the vehicle. It can be mounted with the supplied brackets or permanently mounted in the dash. Attach the microphone as shown.



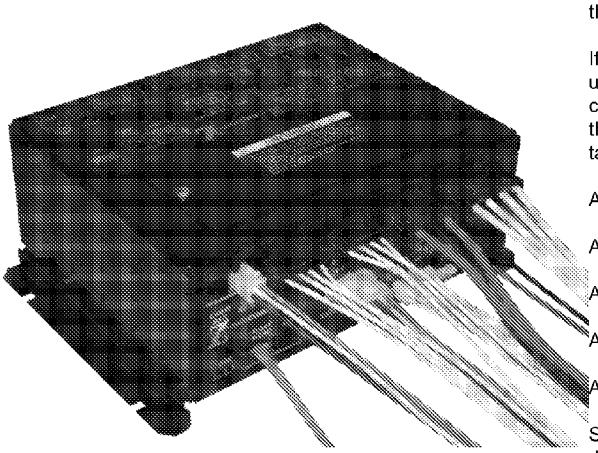


Once the Control head is mounted and microphone connected, mount the amplifier in the trunk of the vehicle.

Attach the CAT 5 cable (T56649) from the Control Head to the Amplifier in the trunk. Route the CAT5 cable as needed through the vehicle so it is not visible to the driver or passengers.



If a Central Controller (CC) light bar is being used with the Z, attach the L/R ARROW, DIM, FLASH cable (T56629) from the Amplifier to the CC light bar. The Outputs & DIM cable (T56631) does not need to be used unless a second light bar that is of the conventional type is to be attached.



If a conventional light bar is to be the only light bar used with the Z, then the L/R ARROW, DIM, FLASH cable (T56629) does not need to be attached. Only the Outputs & DIM cable (T56631) needs to be attached.

Attach the Level 1, 2, & 3 cable. (T56630)

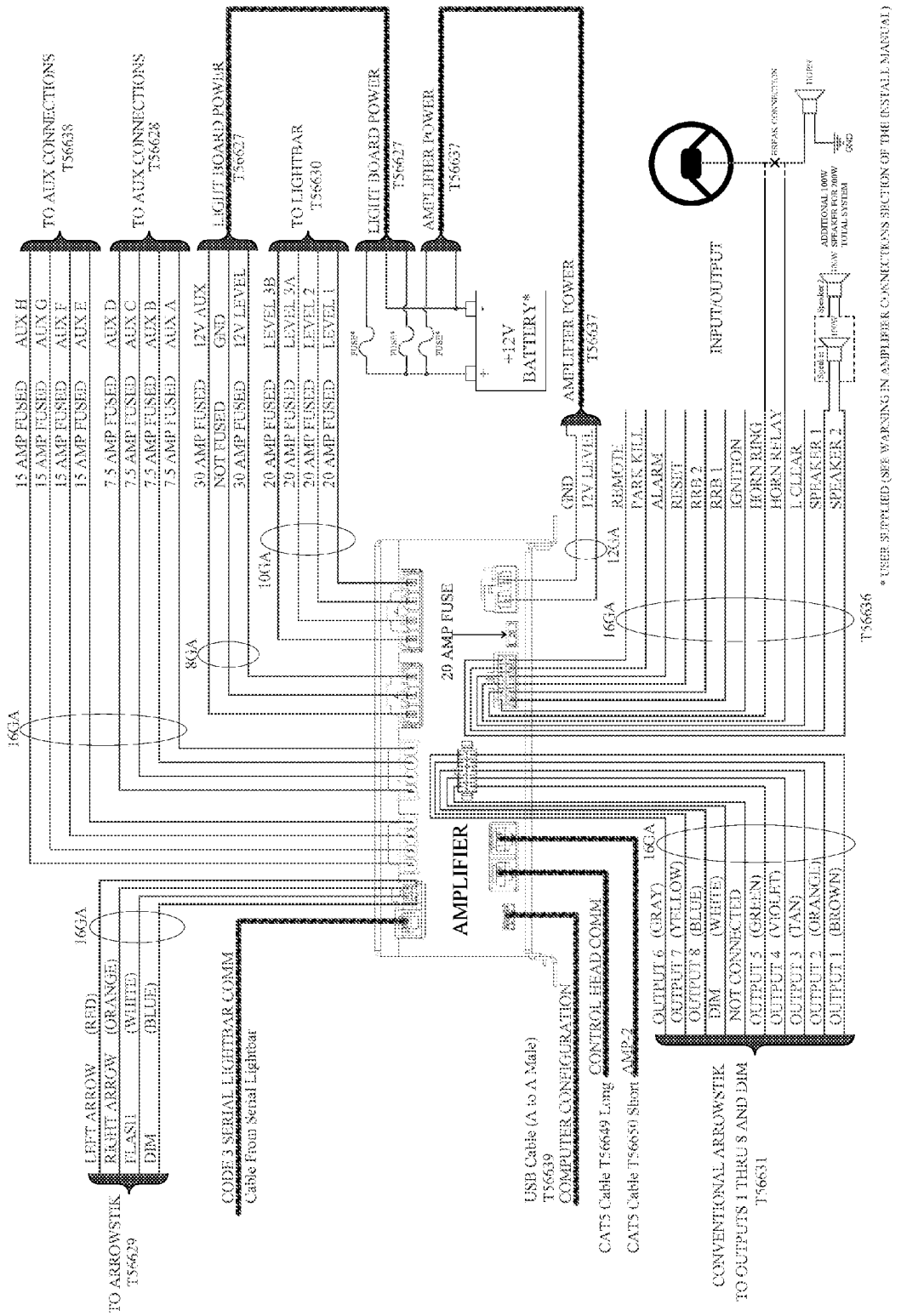
Attach the power cables. (T56627 & T56637)

Attach the Input/Output cable. (T56636)

Attached the AUX A - D cable as needed. (T56628)

Attached the AUX E - H cable as needed. (T56638)

See the wiring diagram on the back of this sheet for detailed wiring of the amplifier.



Wiring Diagram

APPENDIX 7

CODE 3® A PUBLIC SAFETY EQUIPMENT COMPANY

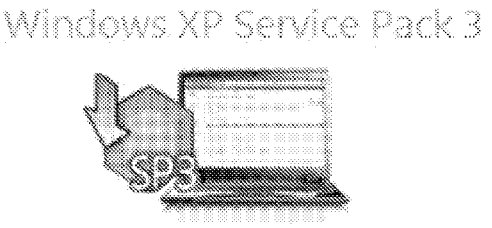
Z Software Quick Setup Manual

Z Siren Configuration Software Requirements

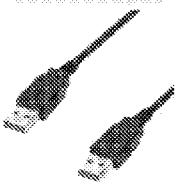
The Z Siren Configuration Software requires the following items to function properly:

- **a PC or laptop computer with a USB port and a CD-ROM drive. This will be referred to as the "Host Computer" in this manual.**
- **Microsoft Windows™ XP Service Pack 3 operating system or higher.**

Software has been tested and verified on Windows XP (SP3), Vista (32 Bit & 64 Bit), and Windows 7 (32 Bit & 64 Bit).



- **a USB cable (A Male to A Male)**



- **Four PDF files are available on the CD. Those include this manual along with the Installation & Operation Manual, Hardware Quick Install Manual, and Software User Manual. The two full manuals are also available through the help drop-down menu of the software. A PDF reader is required to view these manuals.**

Software Installation on Windows XP

Before the Z Siren can be configured, the Z Siren Configuration Software must be installed onto the host computer.

1. Insert the software installation CD into the host computer.
2. If the software automatically starts the install process, skip to step 6. Otherwise go to the next step.
3. From the Windows Start button, select Run, then click on Browse and navigate to your CD drive.
4. Select the Setup.exe file and press Open.
5. Press OK to run Setup.exe which will start the setup.
6. Follow the instructions presented by the installation wizard.

After the software installation is complete, the program is started by double-clicking on the Z icon created on the desktop. The user can then configure and assign features and functions to each of the push-buttons, slide-switch positions, auxiliary inputs, etc. After clicking on the appropriate control, the settings that are available for that control are displayed. The setup can be saved for future use.

NOTE: Do not connect USB cable to the Z3 Siren until the Z3 Configuration Software has fully loaded. Make sure that there is power connected to the two pin connector labeled with +12VDC and GND at the lower right of the Z3 Siren. It is **IMPORTANT** that there is no power to the Ignition input.

Software Installation on Windows 7 and Vista

Before the Z3 Siren can be configured, the Z3 Siren Configuration Software must be installed onto the host computer.

1. Insert the software installation CD into the host computer.
2. If AutoPlay window pops up, select "Run setup.exe" shown in the window below and go to step 6 otherwise continue to step 3.

AutoPlay
DVD Drive (D:) Z3 Config 1.3.4
Always do this for software and games:
Install or run program from your media
Run setup.exe
General options
Open folder to view files
View more AutoPlay options in Control Panel

3. From the Start button, select Run, then click on Browse and navigate to your CD drive.
4. Select the Setup.exe file and press Open.
5. Press OK to run Setup.exe which will start the setup.
6. Follow the instructions presented by the installation wizard.

After the software installation is complete, the program is started by double-clicking on the Z3 icon created on the desktop. The user can then configure and assign features and functions to each of the push-buttons, slide-switch positions, auxiliary inputs, etc. After clicking on the appropriate control, the settings that are available for that control are displayed. The setup can be saved for future use.

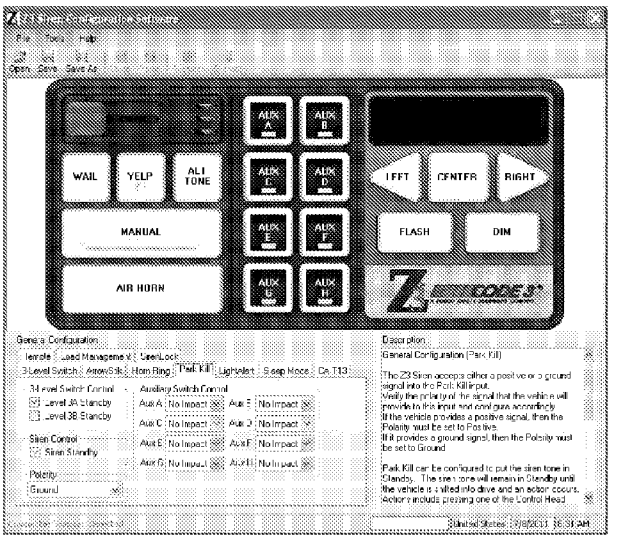
Installation of USB Driver For Z3 Siren

If this is the first time a Z3 Siren has been connected to this computer you will see a window popup. See the Configuration Software User Manual for details. Any future connections need only follow the directions below:

PROGRAMMING A Z3 SIREN

1. Remove USB connection from the Z3 Siren.
2. Remove IGN connection from the Z3 Siren.
3. Remove power connection from the Z3 Siren.
4. Launch the Z3 Siren software.
5. Connect PC to the USB cable.
6. Connect the USB cable to the Z3 Siren.
7. Connect power to the Z3 Siren.
8. Configure the Z3 Siren in the software as desired.
9. Export the configuration to the Z3 Siren.
10. Remove USB cable from the Z3 Siren.
11. Remove power from the Z3 Siren.
12. Repeat steps 6-11 for additional Z3 Sirens.

APPENDIX 8
CONFIGURATION SOFTWARE USER'S MANUAL



CODE 3®
A PUBLIC SAFETY EQUIPMENT COMPANY

Z3 SERIES
SIREN AND CONTROL HEAD

PATENT PENDING

⚠ WARNING

Sirens produce loud sounds that may damage hearing

- Wear hearing protection when testing
- Use siren only for emergency response
- Roll up windows when siren is operating
- Avoid exposure to the siren sound outside of vehicle

Contents:

Z3 Siren Configuration Software Requirements 3
Software Installation on Windows XP 3
Software Installation on Windows 7 and Vista 3
Installation of USB Driver For Z3 Siren 4
Configuring the Control Head Functions 7
General Configuration 8
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ArrowStik 9
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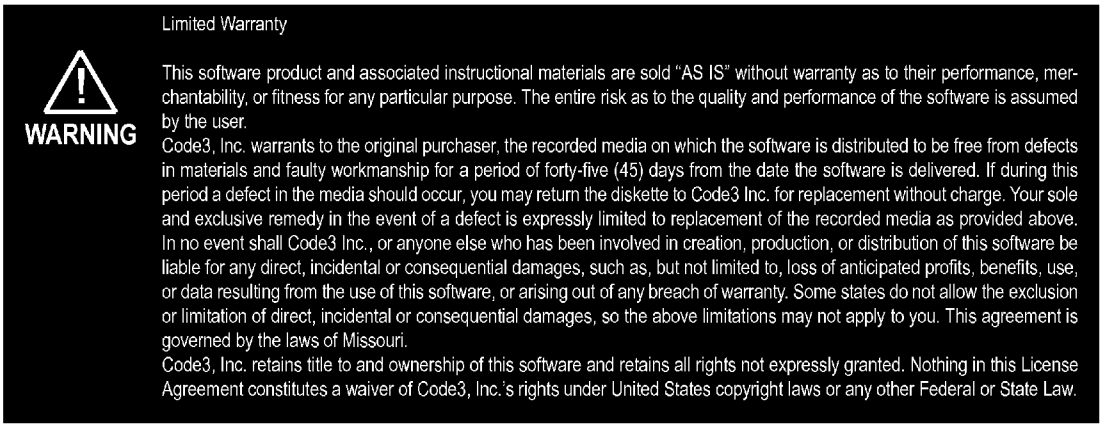
Air Horn 19
Auxiliary 19
ArrowStik LEFT Switch 20
ArrowStik CENTER Switch 21
ArrowStik RIGHT Switch 21
FLASH Switch 22
DIM Switch 22

IMPORTANT: ***Read all instruction and warnings before installing and using.***
INSTALLER: ***This manual must be delivered to the end user of this equipment.***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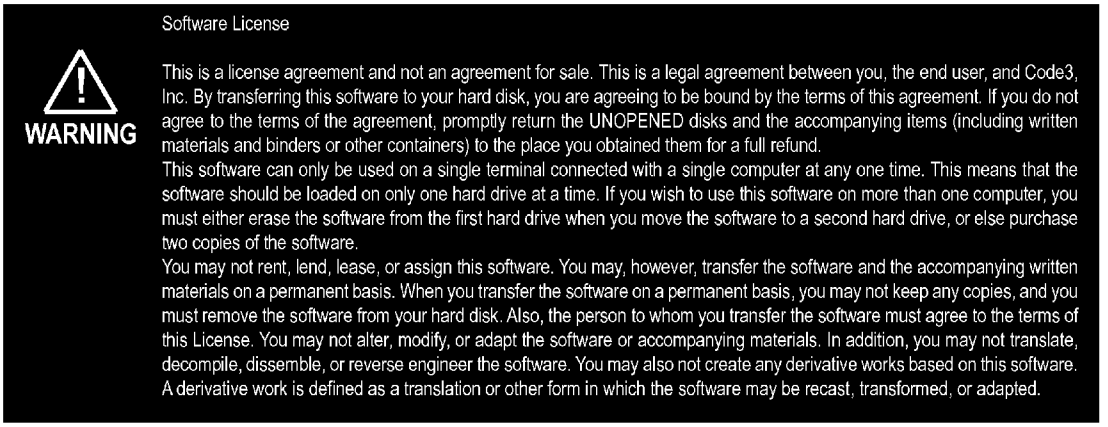
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This software can only be used on a single terminal connected with a single computer at any one time. This means that the software should be loaded on only one hard drive at a time. If you wish to use this software on more than one computer, you must either erase the software from the first hard drive when you move the software to a second hard drive, or else purchase two copies of the software.
You may not rent, lend, lease, or assign this software. You may, however, transfer the software and the accompanying written materials on a permanent basis. When you transfer the software on a permanent basis, you may not keep any copies, and you must remove the software from your hard disk. Also, the person to whom you transfer the software must agree to the terms of this License. You may not alter, modify, or adapt the software or accompanying materials. In addition, you may not translate, decompile, dissemble, or reverse engineer the software. You may also not create any derivative works based on this software. A derivative work is defined as a translation or other form in which the software may be recast, transformed, or adapted.

Siren Configuration Software Requirements

The Siren Configuration Software requires the following items to function properly:

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- **Microsoft Windows™ XP Service Pack 3 operating system or higher.**

Software has been tested and verified on Windows XP (SP3), Vista (32 Bit & 64 Bit), and Windows 7 (32 Bit & 64 Bit).

- **a USB cable (A Male to A Male)**
- **Four PDF files are available on the CD. Those include this manual along with the Installation & Operation Manual, Hardware Quick Install Manual, and Software Quick Setup Manual. The two full manuals are also available through the help drop-down menu of the software. A PDF reader is required to view these manuals.**

Software Installation on Windows XP

Before the Siren can be configured, the Siren Configuration Software must be installed onto the host computer.

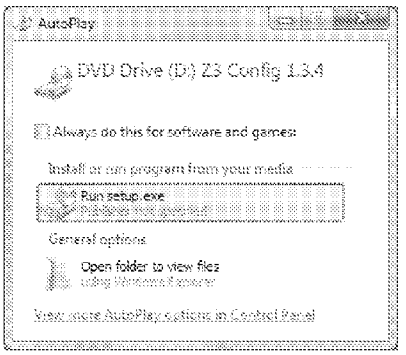
1. Insert the software installation CD into the host computer.
2. If the software automatically starts the install process, skip to step 6. Otherwise go to the next step.
3. From the Windows Start button, select Run, then click on Browse and navigate to your CD drive.
4. Select the Setup.exe file and press Open.
5. Press OK to run Setup.exe which will start the setup.
6. Follow the instructions presented by the installation wizard.

After the software installation is complete, the program is started by double-clicking on the icon created on the desktop. The user can then configure and assign features and functions to each of the push-buttons, slide-switch positions, auxiliary inputs, etc. After clicking on the appropriate control, the settings that are available for that control are displayed. The setup can be saved for future use.
NOTE: Do not connect USB cable to the Z3 Siren until the Z3 Configuration Software has fully loaded. Make sure that there is power connected to the two pin connector labeled with +12VDC and GND at the lower right of the Z3 Siren. It is **IMPORTANT** that there is no power to the Ignition input.

Software Installation on Windows 7 and Vista

Before the Siren can be configured, the Siren Configuration Software must be installed onto the host computer.

1. Insert the software installation CD into the host computer.
2. If AutoPlay window pops up, select "Run setup.exe" shown in the window on the next page and go to step 6 otherwise continue to step 3.



3. From the Start button, select Run, then click on Browse and navigate to your CD drive.

4. Select the Setup.exe file and press Open.

5. Press OK to run Setup.exe which will start the setup.

6. Follow the instructions presented by the installation wizard.

After the software installation is complete, the program is started by double-clicking on the Z icon created on the desktop. The user can then configure and assign features and functions to each of the push-buttons, slide-switch positions, auxiliary inputs, etc. After clicking on the appropriate control, the settings that are available for that control are displayed. The setup can be saved for future use.

Installation of USB Driver For Z3 Siren

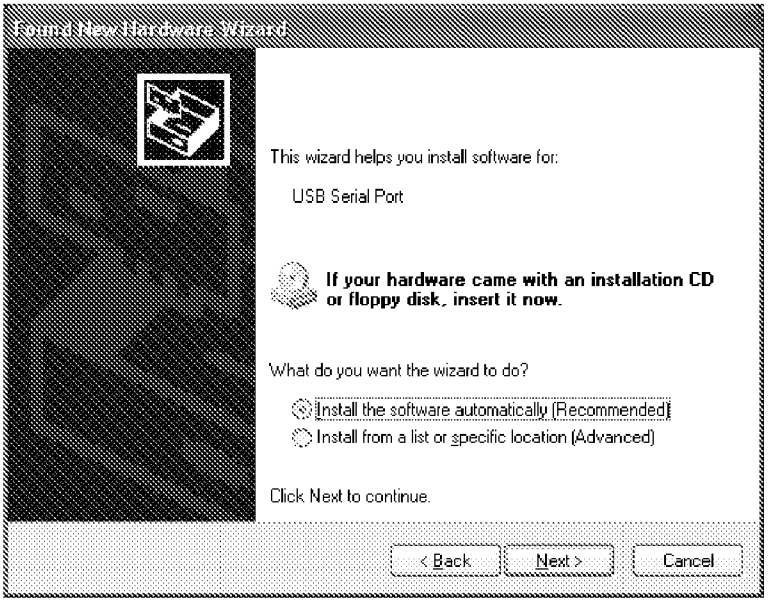
The first time a Z3 Siren is connected to a computer you will see a window popup similar to the one on the following page. Follow the steps on the next page to install the USB driver for the Z3 Siren. Any time a Z3 Siren is connected in the future, the software will recognize it and connect automatically. NOTE: This process will have to be repeated if a different USB port is used.

PROGRAMMING A Z3 SIREN

1. Remove USB connection from the Z3 Siren.
2. Remove IGN connection from the Z3 Siren.
3. Remove power connection from the Z3 Siren.
4. Launch the Z3 Siren software.
5. Connect PC to the USB cable.
6. Connect the USB cable to the Z3 Siren.
7. Connect power to the Z3 Siren.
8. Configure the Z3 Siren in the software as desired.
9. Export the configuration to the Z3 Siren.
10. Remove USB cable from the Z3 Siren.
11. Remove power from the Z3 Siren.
12. Repeat steps 6-11 for additional Z3 Sirens.

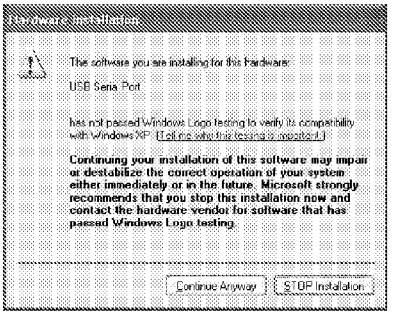
Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
Next >
Cancel

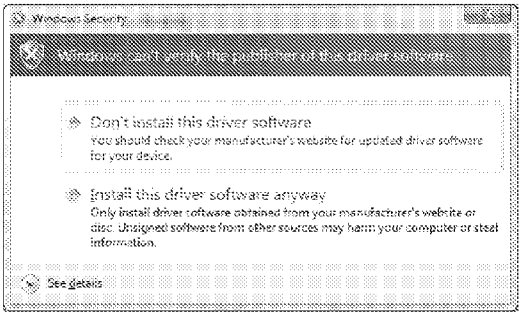
1. Select “No, not this time” and press the Next button.


Found New Hardware Wizard
This wizard helps you install software for:
USB Serial Port
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

2. Select “Install the software automatically (Recommended)” and press the Next button.

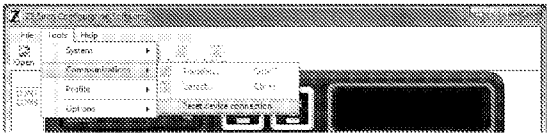
3. A Windows Logo compatibility warning may display.
- In Windows XP it will look like the following screenshot on the left. Click on the "Continue Anyway" button to finish the installation.
- In Windows 7 it will look like the following screenshot on the right. Click on the "Install this driver software anyway" button to finish the installation.


Hardware Installation
The software you are installing for this hardware:
USB Serial Port
has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation


Windows Security
Don't install this driver software
You should check your manufacturer's website for updated driver software for your device.
Install this driver software anyway
Only install driver software obtained from your manufacturer's website or disc. Unsigned software from other sources may harm your computer or steal information.
See details

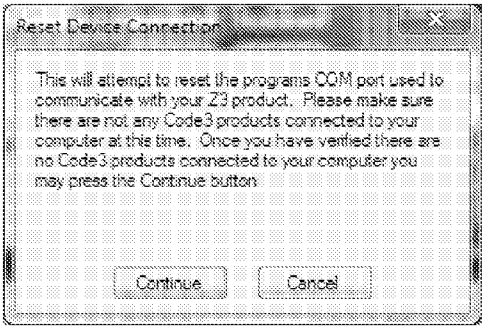
The installation is now complete. The software will recognize any amplifier connected from this time forward to any USB port.

NOTE: If the computer does not recognize the Z Siren, first check the power supplied to the Z Siren. Second, check the USB cable for proper connection to the computer. Third, in the Z Siren Configuration Software, press the Tools drop-down menu, and select Communications & Reset device connection as seen in the figure below. (This is the same process used if the USB connection is moved to a new port.)

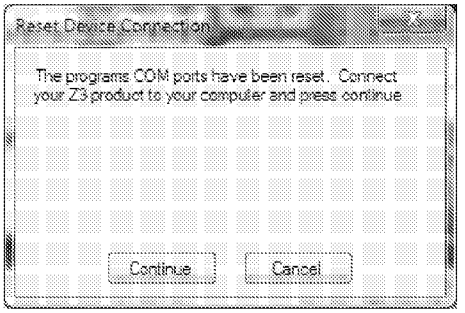


(Tools>Communications>Reset device connection).

The following window should pop up.


Reset Device Connection
This will attempt to reset the programs COM port used to communicate with your Z3 product. Please make sure there are not any Code3 products connected to your computer at this time. Once you have verified there are no Code3 products connected to your computer you may press the Continue button
Continue
Cancel

ATTENTION!!! Make sure you disconnect the USB cable at this point or the reset will not work properly. Once the USB cable is disconnected then press the Continue button.


Reset Device Connection
The programs COM ports have been reset. Connect your Z3 product to your computer and press continue
Continue
Cancel

ATTENTION!!! Make sure you now reconnect the USB cable at this point or the reset will not work properly. Once the USB cable is reconnected then press the Continue button. The software should find the Z3 Siren connected to the computer. If you are still having trouble, contact your Code 3 service department.

Figure 1A

Figure 1B

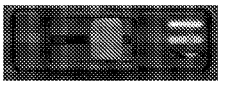


Figure 1C

Figure 1D

Configuring the Control Head Functions

The Z3 Siren configuration software is used to assign amplifier module functions to control head switches. It can also configure these functions to operate in various manors.

The first step in configuring the Z3 Siren control head is to understand how to operate the software. Whenever the Z3 Siren program is started you will come up with the Control Head in the off mode. When the user clicks in the area to the left of the switch, the software will return to the General Configuration mode (Figure 1A). Figure 1B is the Level 1 position, Figure 1C is the Level 2 position, and Figure 1D is the Level 3 Position. When the user left-clicks in the slide switch area the slide switch will move to the left (until it is off). When the user right-clicks in the slide switch area the slide switch will move to the right (until it is in the Level 3 position). Clicking on the Green, Amber, or Red indicator lights in the Configuration Software allows the user to jump directly to that level's options.

The parameters for each control are displayed by clicking on the graphical representation of the desired push-button, slide switch position, or function (hereafter referred to collectively as "controls"). The lower-right corner of the screen offers the user a description of the selected controls functions.

General Configuration

When the program first starts or when the 3-Level Switch is in the left most position (Figure 1A) and no push-buttons are pressed, the General Configuration settings are visible (see Figure 2 below). NOTE: IF ANY BUTTON IS PRESSED, SIMPLY FLIP THE 3-LEVEL SWITCH TO THE POSITION SHOWN IN FIGURE 1A TO SEE THE GENERAL CONFIGURATION SETTINGS. These settings allow you to configure the 3-Level Switch, ArrowStik™, Horn Ring, Park Kill, Light Alert, Sleep Mode, CA T13, Remote In, Load Management and SirenLock™ options.

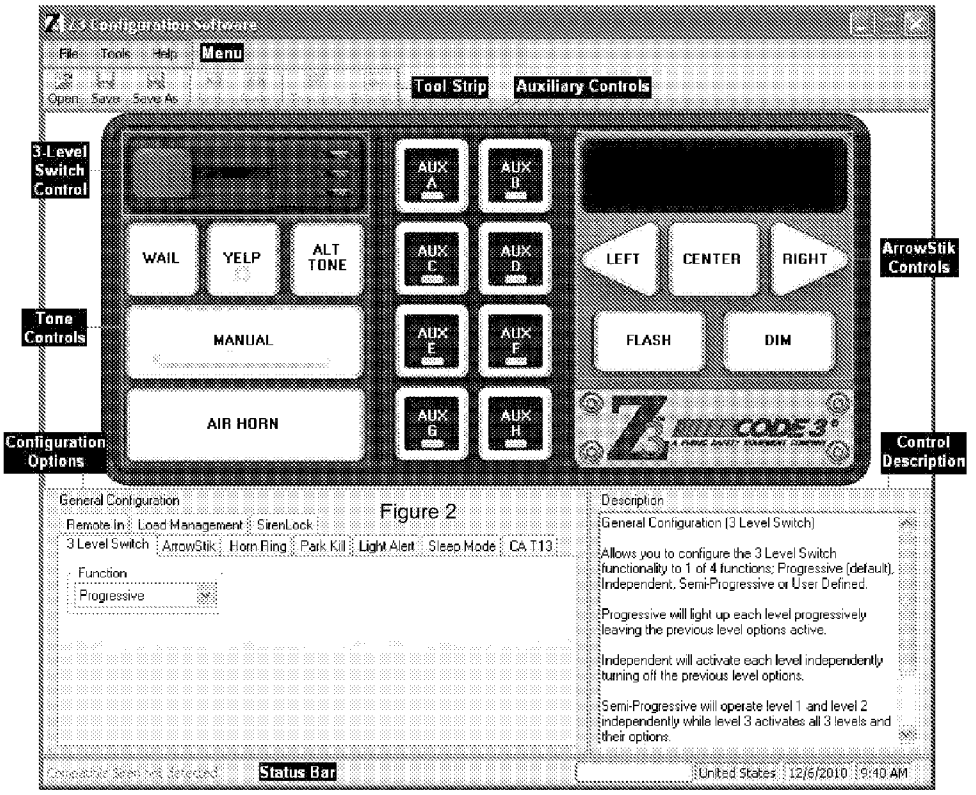


Figure 2

Figure 2

Only one switch or push-button may be configured at a time. When configuring the 3-Level switch you must left click the mouse for the switch to flip to the left and right click to flip to the right.

The configuration options are as follows:

3-Level Switch

The settings for the 3-Level Switch (Figure 3) allow you to choose how the 3-Level Switch will respond when in each level of operation. There are four options to choose from:

- **Progressive** – Lights up each level progressively leaving the previous level options on. This is the most common and is the default.
- **Independent** – Each level is activated independently from one another. This can be seen when flipping the 3-Level Switch. You will notice it only lights the yellow LED when switched to Level 2, and only the red LED lights when switched to Level 3.
- **Semi-Progressive** – Levels 1 & 2 are independent while level 3 activates all 3 levels.
- **User Defined** – Allows you to choose how you want each level to operate. Level 1 will always operate Level 1 and is therefore not customizable.

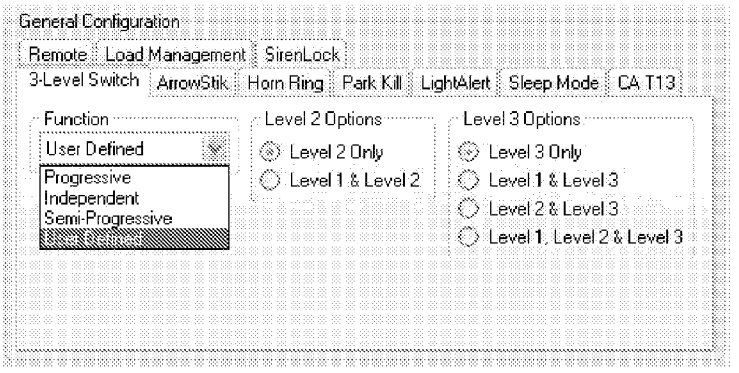


Figure 3

ArrowStik

The settings for the ArrowStik (Figure 4) are defaulted to None. This is the setting used if a Centrally Controlled (CC) ArrowStik is being used. If you have a conventional ArrowStik you can select the number of heads it has on the bar. The following options are available:

- **ArrowStik Characterization** – Drop down list for external ArrowStik (5, 6, or 8 heads).
- **End Flash** – Enable End Flash works only on 5 and 6 head light bars.
- **PWM Dimming** – Enable PWM Dimming should be used for LED ArrowStiks only.

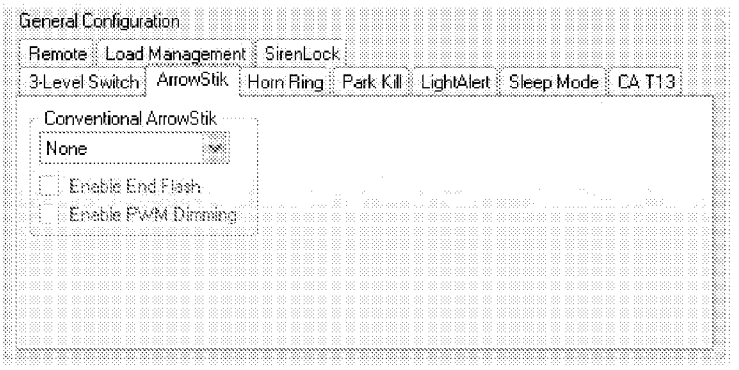


Figure 4

Horn Ring

The Horn Ring transfer relay is built in and automatically activated at Levels 2 and 3 of the 3-Level switch.

- **Enable –**
  - Always – The Horn Ring can always be enabled no matter what the status of the Siren.
  - With Horn Ring Transfer – The Horn Ring Transfer is a relay that will disable the Horn Ring when the siren or lights are on.
- **Polarity –**
  - Ground – The Horn Ring must be pulled low in order for it to be activated.
  - Positive – The Horn Ring must be pulled high in order for it to be activated.
- **Siren Active –**
  - Hit-N-Go – Hit-N-Go only works when the siren is active. Once the siren is active and the Auxiliary switch is turned on, Hit-N-Go is activated by hitting the Horn Ring (Vehicle Horn Control) or switching the Remote In. It will go to the Override tone for 8 seconds and then return to the primary tone. The actual tone for the Hit-N-Go depends on which switch has been pressed. The Override tone for the switch that is pressed is what will sound when the Horn Ring or Remote In is pressed. The MANUAL switch can be configured to activate Hit-N-Go but again only works when the siren is active. See the MANUAL section for details.
  - Scroll – Scroll works exactly like Hit-N-Go except for the following rules. Instead of switching to the Hit-N-Go tone, it will switch to the next primary tone. The primary tones are the WAIL, YELP, and ALT TONE. Only the ALT TONE is configurable from the default of Hi-Lo 1. Instead of switching back after 8 seconds, it will continue indefinitely with the next primary tone. For example, if you press the WAIL switch the Wail tone will sound indefinitely. If you tap the horn, it will permanently switch to the Yelp tone. If you tap the horn again it will permanently switch to the Hi-Lo 1 tone. If you tap it again, it will permanently return to the Wail tone.
  - Scroll On/Off - Functions the same as Scroll except an off state is added into the scroll.
  - Manual Wail – Siren must be active. Press the horn ring to receive the Manual Wail until releasing the horn ring.
  - Wail Stop – Siren must be active. Press the horn ring to receive one Wail Stop then return to the active siren tone.
  - Air Horn 1 – Siren must be active. Press the horn ring to receive the Air Horn 1 tone continuously until releasing the horn ring.
  - Air Horn 2 – Siren must be active. Press the horn ring to receive the Air Horn 2 tone continuously until releasing the horn ring.
- **Siren Inactive –**
  - None – Siren must be off. With this selection the horn ring will activate the vehicle horn.
  - Manual Wail – Siren must be off. The vehicle horn will be disconnected and the Manual Wail will sound in its place.
  - Wail Stop – Siren must be off. The vehicle horn will be disconnected and the Wail Stop will sound in its place.
  - Air Horn 1 – Siren must be off. The vehicle horn will be disconnected and the Air Horn 1 will sound in its place.
  - Air Horn 2 – Siren must be off. The vehicle horn will be disconnected and the Air Horn 2 will sound in its place.
- **Hands-Free Scroll – (not configurable so not shown)**
  - Hands-Free – If Hands-Free is configured on one of the Auxiliary switches and that Auxiliary switch is turned on then the horn ring will scroll through the WAIL, YELP, and ALT TONE switches when pressed.

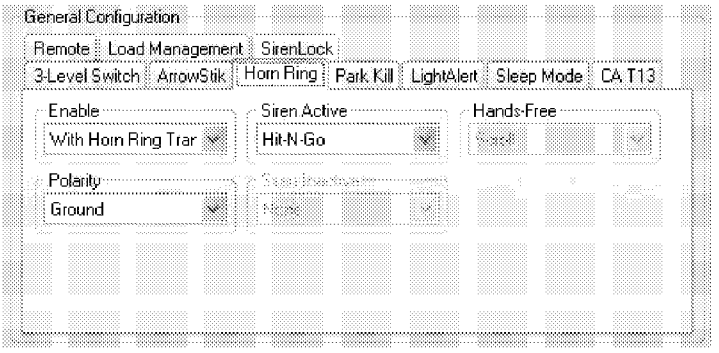


Figure 5

Park Kill

This feature deactivates the siren tones and drops-out the level 3 lighting when the vehicle is shifted into park. Once Park Kill is activated the siren will remain deactivated until the vehicle is shifted into drive and an action occurs such as depressing one of the siren control switches, changing the position of the lighting level switch or keying the microphone. Any of these actions will cause the siren tones to start again.

Park Kill has the following options:

- **3-Level Switch Control** – Allows you to pause Level 3A and/or Level 3B outputs.
- **Siren Control** – Allows you to pause the siren.
- **Polarity** – Allows you to set the Park Kill input polarity (Positive or Ground)
- **Auxiliary Switch Control** – Allows you to select how Park Kill will impact the Auxiliary Switches.
  - No Impact – No impact on the Auxiliary switch.
  - Off – Turns the Auxiliary Switch Off.
  - Pause – Pauses the Auxiliary Switch. Output returns to the previous state when vehicle is shifted out of park.

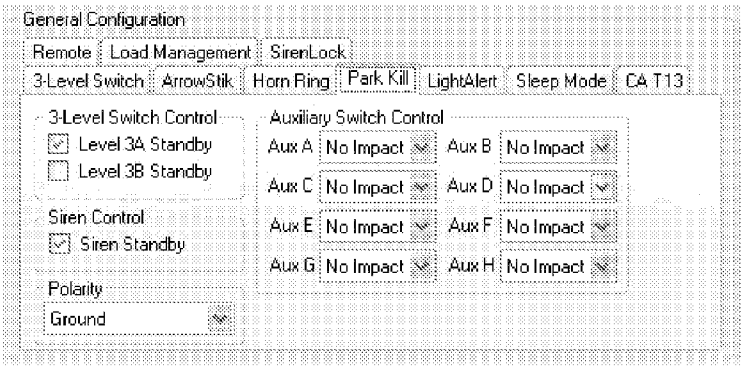


Figure 6

Light Alert

LightAlert is intended to alert the operator with an audible tone, when any lighting switch is activated. You can set which lighting switch(s) alerts the operator when in use.

By default, Light Alert is enabled for all lighting switches and can be selectively disabled if Light Alert is not desired for a given switch function.

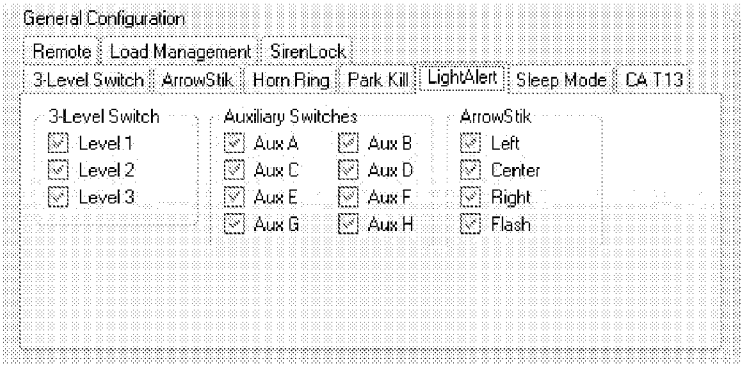


Figure 7

Sleep Mode

Sleep mode allows you to set how long the Siren remains on after the vehicle ignition is turned off. Sleep Mode options include the following choices:

- **Instant –** Turns the Siren off immediately when vehicle ignition is turned off.
- **10 Minutes** – Delays turning the Siren off 10 minutes after vehicle ignition is turned off.
- **20 Minutes** – Delays turning the Siren off 20 minutes after vehicle ignition is turned off.
- **30 Minutes –** Delays turning the Siren off 30 minutes after vehicle ignition is turned off.

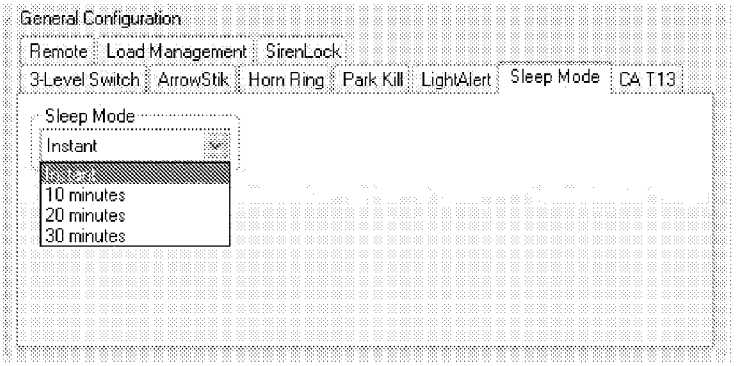


Figure 8

CA T13

This allows you to automatically set the unit to be California title 13 compliant.

When CA T13 is enabled, ALT TONE will automatically be disabled, AIR HORN will be disabled when any siren tone or emergency warning light is active and SirenLock will be enabled for Level 3. CA T13 is disabled by default.

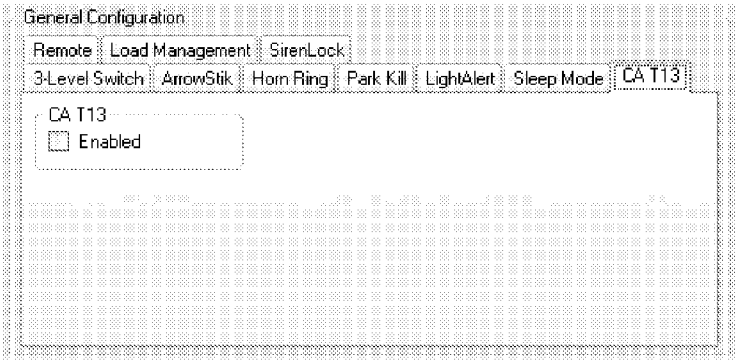


Figure 9

Remote

Remote can be set the same way as the Horn Ring with one exception. The Remote also has Hands-Free options. The Hands-Free of the Remote tab can be set to the following modes assuming Hands-Free is configured on one of the Auxiliary switches and that switch is turned on (see figure 10):

- **Hands-Free Scroll –**
  - None – If set to None then nothing will happen when the Remote In switch is pressed.
  - Scroll – If set to Scroll then it functions identical to the Horn Ring in Hands-Free mode.
  - Manual Wail – If set to Manual Wail then pressing the Remote In switch sounds the Manual Wail.
  - Wail Stop – If set to Wail Stop then pressing the Remote In switch sounds the Wail Stop.
  - Air Horn 1 – If set to Air Horn 1 then pressing the Remote In switch sounds the Air Horn 1.
  - Air Horn 2 – If set to Air Horn 2 then pressing the Remote In switch sounds the Air Horn 2.

Turning off the sound or deactivating Hands-Free is performed identically to that of the horn ring.

Figure 10

Load Management

Load Management allows you to set up to three Dropout Voltage Groups by selecting which output(s) to drop out when the vehicle power levels fall to the specified groups Voltage Fault Threshold and the Dropout Delay time has elapsed.

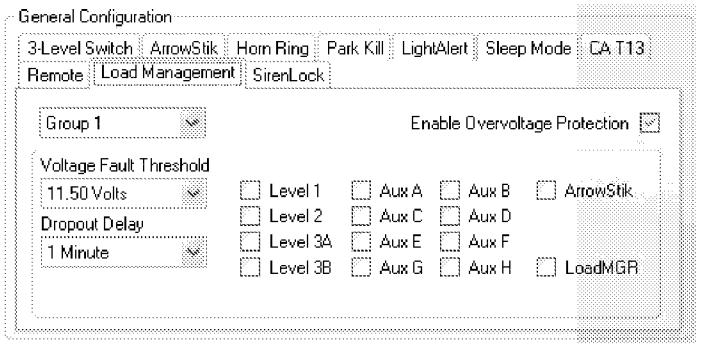


Figure 11

SirenLock

SirenLock is used to specify which 3-Level switch position (Level 1, 2 or 3) will activate the siren. By default, SirenLock is disabled. With SirenLock disabled, the Siren will be in a "Siren Active" mode of operation, and this will disable the "Siren Inactive Function" for the Horn Ring input, Remote input, and Manual push-button. Air Horn, Radio Rebroadcast, Manual, and Public Address are unaffected by this feature.

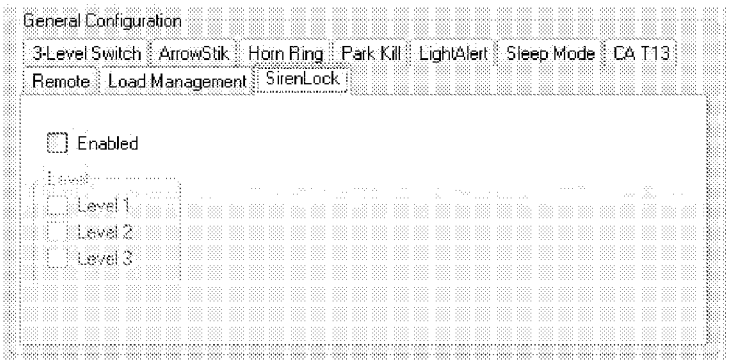


Figure 12

EU Lock

This function is to meet the requirements of some European Union countries to verify the Warning Lights for the emergency vehicle are actually operational before allowing the siren to generate tones. This is normally configured to be disabled in the Siren Configuration Software under the remote tab shown in figure 10. It can be enabled during configuration of the siren. This option requires a user provided current sense module for the lights.

NOTE: By enabling this feature the Remote input will disable all Siren tones until the Remote input is activated.

Push-Buttons & Switch Configuration

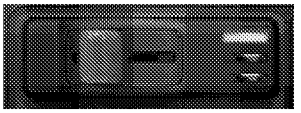
When the 3-Level Switch is flipped to the Level 1, 2, or 3 position, the Control Head is in the ON mode. Similarly, when any push-buttons are pressed the Control Head is in the ON mode.

3-Level Switch

This switch activates or deactivates the three levels of vehicle lights and siren or turns them off. As you move the switch from left to right, you will activate each level as defined by the General Configuration, 3-Level Switch tab. These levels usually correspond to the urgency of a call, such as Code 1, Code 2, and Code 3. Thus, each increasing level usually activates more lights and/or the siren. This switch can be positioned in several ways. Clicking on the left mouse button once moves the switch to the left one level. Clicking on the right mouse button once moves the switch to the right one level. Clicking on the Green, Amber, or Red "LED's" will jump to that level. Clicking in the light grey area on the left side of the switch will jump to "Stand By" or Off thus returning you to the General Configuration options (See Figure 2).

NOTE: The 3-Level switch may be overridden by other push-buttons. If the push-buttons are programmed to a higher level than the position of the 3-Level switch, the push-buttons will take precedence. If the push-buttons are programmed to a lower level than the position of the 3-Level switch, the 3-Level switch will take precedence. The lighting can be set to various levels for the WAIL, YELP, ALT TONE, MANUAL, and AUX push-buttons. Visit these sections in the configuration software to set these preferences.

Level 1



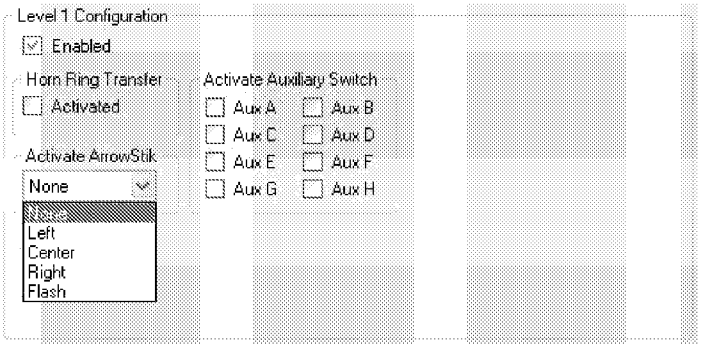
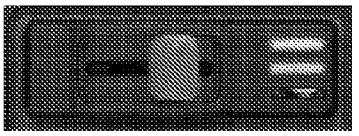


Figure 13

Level 2



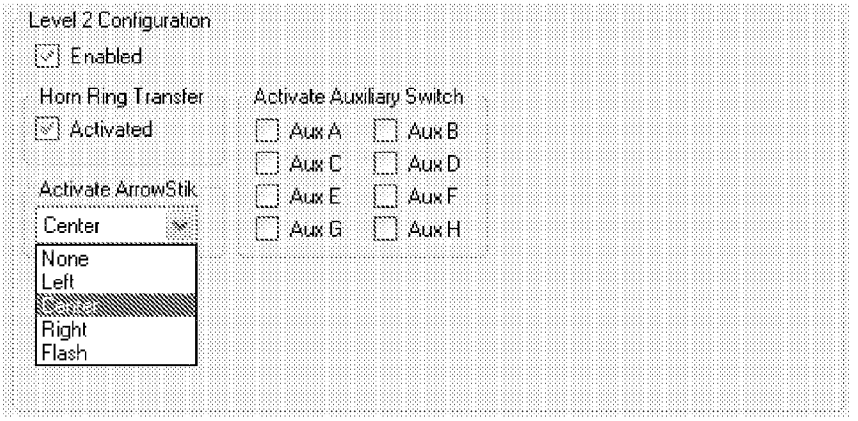
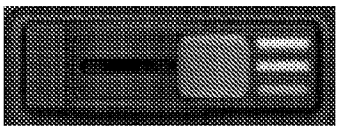


Figure 14

Level 3



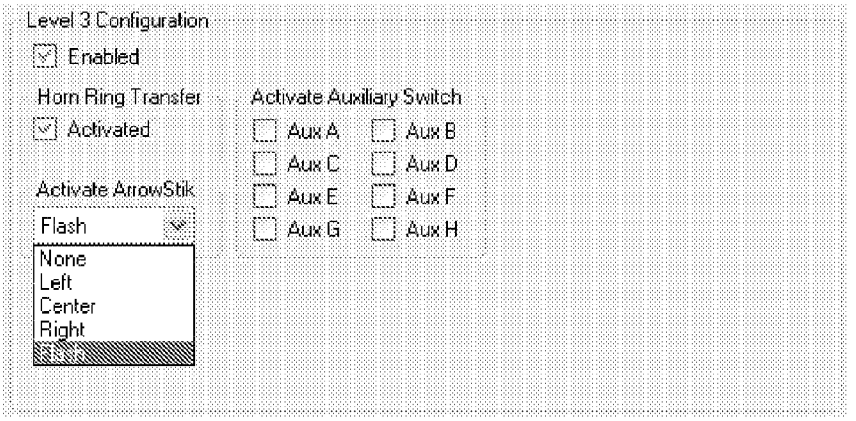


Figure 15

WAIL Switch Configuration

This switch controls the Wail tone and its features. It cannot be disabled.

An override tone may be selected. The override tone is the Yelp tone by default but can be changed to multiple other tones if desired.

If SirenLock is disabled, the WAIL switch can also activate the 3-Level switch and any of the auxiliary switches. Figure 16 is shown with SirenLock disabled. (Setting the 3-Level Switch option in this section may affect the function of the 3-Level switch. See the 3-Level Switch section for further explanation.)

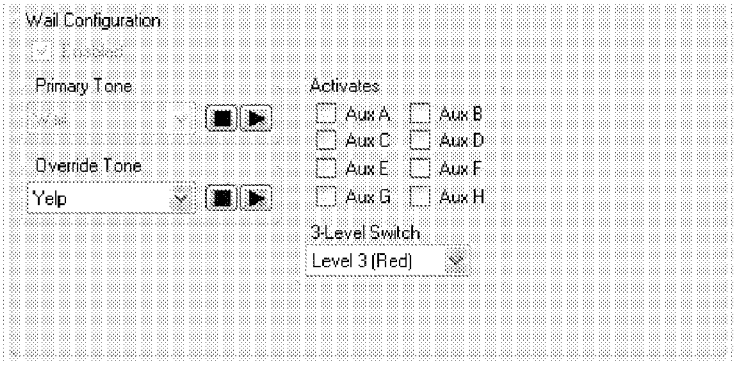


Figure 16

YELP Switch Configuration

This switch controls the Yelp tone and its features. It cannot be disabled.

An override tone may be selected. The override tone is the Hyper-Yelp 1 by default but can be changed to multiple other tones if desired.

If SirenLock is disabled, the YELP switch can also activate the 3-Level switch and any of the auxiliary switches. Figure 17 is shown with SirenLock disabled. (Setting the 3-Level Switch option in this section may affect the function of the 3-Level switch. See the 3-Level Switch section for further explanation.)

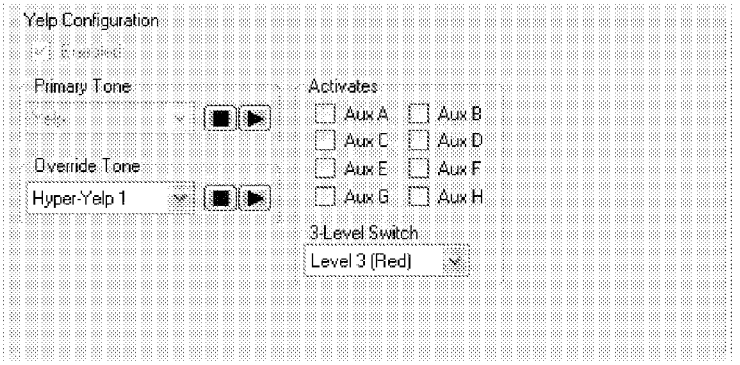


Figure 17

ALT TONE Switch Configuration

The Primary Tone is user selectable from multiple tones. The Override Tone is user selectable from multiple tones, and it should be different than that selected as the Primary Tone.

If SirenLock is disabled, the ALT TONE switch can also activate the 3-Level switch and any of the auxiliary switches. Figure 18 is shown with SirenLock disabled. Setting the 3-Level Switch option in this section may affect the function of the 3-Level switch. See the 3-Level Switch section for further explanation.

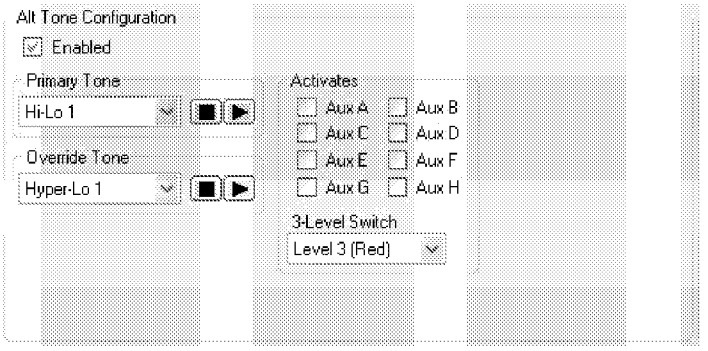


Figure 18

MANUAL

The MANUAL switch has multiple functions described below:

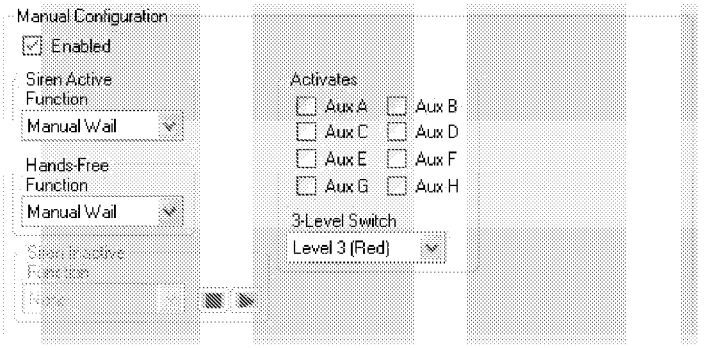


Figure 19

- **Siren Active Function –**
  - None – MANUAL switch is disabled.
  - Hit-N-Go – When the siren is active, each time the MANUAL switch is pressed, the siren will sound the Hit-N-Go tone that has been assigned as the override tone for seven seconds. It will then revert back to previous tone.
  - Scroll – When the siren is active, each time the MANUAL switch is pressed the siren will scroll to the next of the three primary tones (Wail, Yelp, and Alt tones). When the last tone is reached it will scroll back to the Wail tone.
  - Manual Wail – When the siren is active and the MANUAL switch is pressed, the siren will start the Manual Wail tone. The tone will ramp up and hold the highest note until the MANUAL switch is released. Once released, the tone will ramp down and return to the active siren.
  - Wail Stop – When the siren is active and the MANUAL switch is pressed, the siren will start the Wail Stop tone. The tone will ramp up and hold the highest note until the MANUAL switch is released. Once released, the tone will immediately return to the active siren.

- **Hands Free Function –**
  - None – Hands-Free MANUAL switch is disabled.
  - Scroll – If set to Scroll and Hands-Free is activated then the siren will scroll through all tones available to the every time the MANUAL button is pressed. Pressing and holding the MANUAL button will turn off the tones.
  - Manual Wail – See description above.
  - Wail Stop – See description above.
- **Siren Inactive Function –**
  - None – MANUAL switch is disabled.
  - Manual Wail – See description above.
  - Wail Stop – See description above.
- **Activates Section –**
  - Can activate any combination of Auxiliary buttons.
  - Can activate Level 1, 2, or 3 lighting. (Setting the 3-Level Switch option in this section may affect the function of the 3-Level switch. See the 3-Level Switch section for further explanation.)

  NOTE: These options are activated any time the Manual Wail tone or the Wail Stop tone is used. The occurs during the use of the MANUAL push-button, Remote input, and Horn Ring input.
  WARNING: By default, the siren will activate the Level 3 switch. Disabling this feature will allow the Siren tone to be generated without having the lights on. This is not recommended and is illegal in some jurisdictions.

Air Horn

Pressing the Air Horn switch will produce the Air Horn sound. This is a momentary switch meaning that the sound is only produced while the switch is being pressed. The two options available for the Air Horn are shown below:

- **Enable –** This can be set to 'Always Enabled', 'Disabled when Siren Active' or 'Always Disabled'.
- **Primary Tone –** The tone to generate when the Air Horn switch is pressed. This can be set to Air Horn 1 or 2.

NOTE: The operation of the Air Horn function is modified when CA Title 13 is selected in the General Configuration section.

Auxiliary

The Auxiliary switches may be configured to set the function and which outputs are activated when the switch is pressed. These switches are enabled by default and can be disabled if the function is not required. All Auxiliary switches have the same functions and can activate one or more Auxiliary switches. AUX G and AUX H have an additional option of selecting the polarity either positive or ground. This only affects the AUX G or AUX H output. This option is not available on AUX A - F outputs.

When RRB or Hands-Free is selected the output for that button is still operational in Toggle On/Off mode. When Hands-Free is the selected function an additional pull-down box appears allowing the selection of the Level 1, 2, 3 lighting functions. These selected functions will be activated when Hands-Free function activates the Siren. (Setting the 3-Level Switch option in this section may affect the function of the 3-Level switch. See the 3-Level Switch section for further explanation.)

AUX A – AUX F

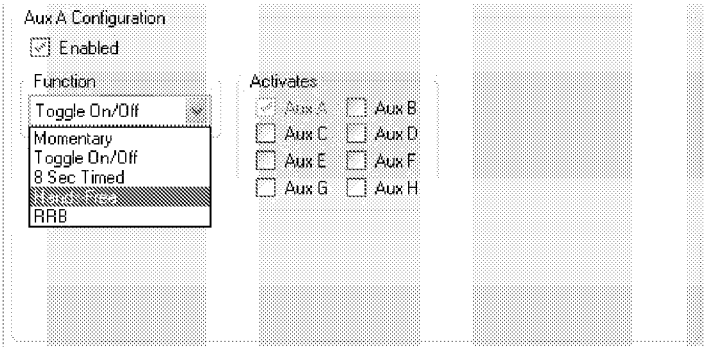


Figure 20

AUX G – AUX H

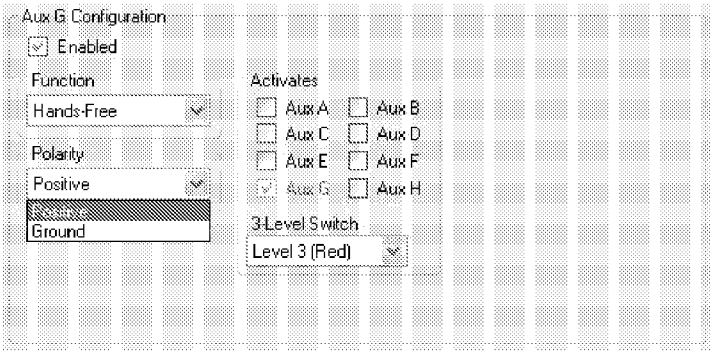


Figure 21

ArrowStik LEFT Switch

The LEFT switch can be configured to operate a conventional ArrowStik in 1 of 4 selectable patterns – Build/Collapse, Building (default), Building 3 Flash or Traveling Ball 3 Flash. Additionally the rate (slow, medium, fast) may also be modified. In order to configure these settings you must select a 5, 6, or 8 head conventional ArrowStik under the ArrowStik tab in the General Configuration section.

You will always see an example of your selection displayed in the ArrowStik indicator. This is only an example and may not represent the actual speed of the ArrowStik.

Activating the LEFT switch will automatically turn off the CENTER, RIGHT, or FLASH switches.

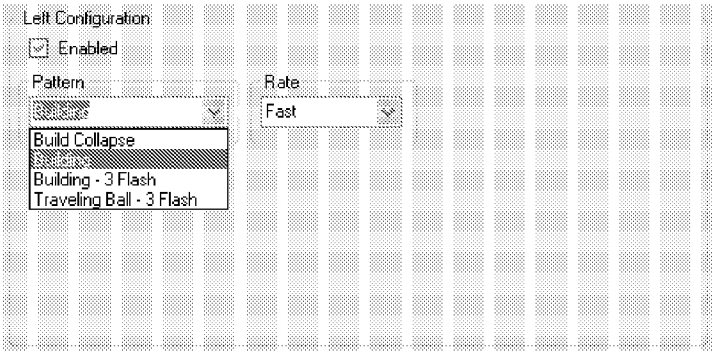


Figure 22

ArrowStik CENTER Switch

The CENTER switch operates a conventional controlled ArrowStik in 1 of 4 selectable patterns – Build/Collapse, Building (default), Building 3 Flash or Traveling Ball 3 Flash. Additionally the rate (slow, medium, fast) may also be modified.

If you have defined an ArrowStik in the General Configurations, you will see an example of your selection displayed. This is only an example and may not represent the actual speed of the ArrowStik.

Activating the CENTER switch will automatically turn off the LEFT, RIGHT, or FLASH switches.

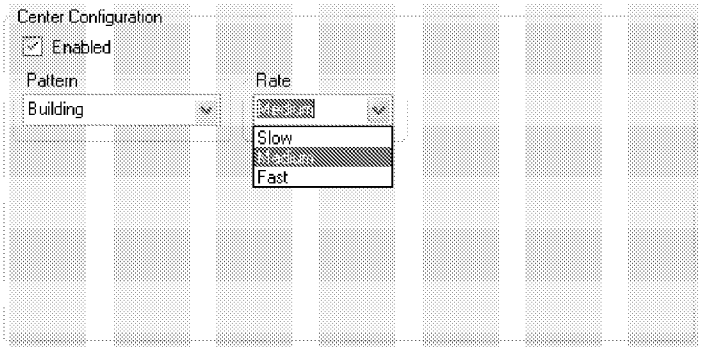


Figure 23

ArrowStik RIGHT Switch

The RIGHT switch operates a conventional controlled ArrowStik in 1 of 4 selectable patterns – Build/Collapse, Building (default), Building 3 Flash or Traveling Ball 3 Flash. Additionally the rate (slow, medium, fast) may also be modified.

If you have defined an ArrowStik in the General Configurations, you will see an example of your selection displayed. This is only an example and may not represent the actual speed of the ArrowStik.

Activating the RIGHT switch will automatically turn off the LEFT, CENTER, or FLASH switches.

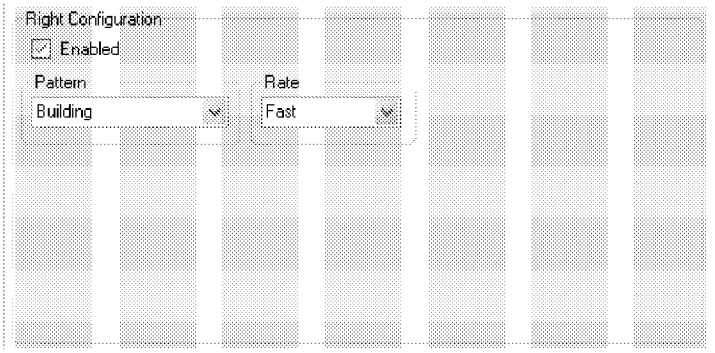


Figure 24

FLASH Switch

The FLASH switch operates a conventionally controlled ArrowStik in 1 of 5 selectable patters – Standard (default), Simultaneous, Even/Odd, Left/Right or Traveling Ball. Additionally the rate may also be modified.

If you have defined an ArrowStik in the General Configurations, you will se an example of your selection displayed. This is only an example and may not represent the actual speed of the ArrowStik.

Activating the FLASH switch automatically turns off the LEFT, CENTER or RIGHT switches.

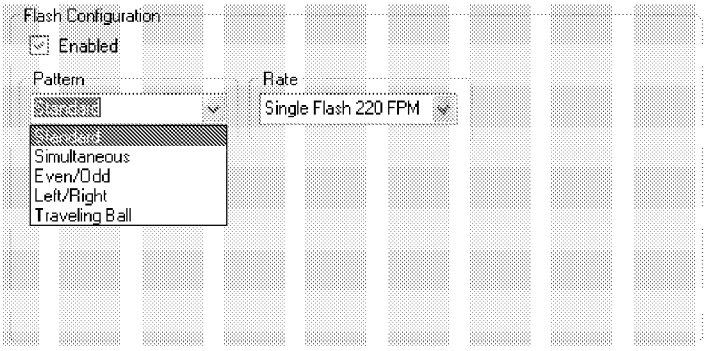


Figure 25

NOTE: The ArrowStik control switch will always operate the Central Controller (CC) ArrowStik output on the Siren. CC ArrowStik flash patterns must be set in the product. See the install manual shipped with product.

DIM Switch

The DIM switch is used to dim the light bar and does not have any configuration options.

Figure 26

Please note that when the ArrowStik is in DIM mode, changing the 3-Level Switch will toggle the ArrowStik back to bright mode.

NOTES

WARRANTY

Code 3®, Inc.'s emergency devices are tested and found to be operational at the time of manufacture. Provided they are installed and operated in accordance with manufacturer's recommendations, Code 3®, Inc. guarantees all parts and components except the lamps to a period of 1 year, LED Lighthead modules to a period of 5 years (unless otherwise expressed) from the date of purchase or delivery, whichever is later. Units demonstrated to be defective within the warranty period will be repaired or replaced at the factory service center at no cost.

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What is claimed is:

1. A system for controlling the use of an emergency warning light system and for controlling the use of a siren system in a motorized vehicle, said system comprising:

a user control panel for receiving user input and for displaying system status;

one or more processors for controlling operation of the system in response to received user input and for providing system status for display; and

storage media encoded with emergency warning light system instructions for execution by one or more of the processors for controlling the actuation of the emergency warning light system and for controlling light patterns generated by the emergency warning light system;

the storage media further encoded with siren system instructions for execution by one or more of the processors for controlling the actuation of the siren system and for controlling audible sounds generated by the siren system.

2. The system of claim **1** further comprising an input/output (I/O) port for exchanging data with an external computer.

3. The system of claim **2** wherein the I/O port comprises a USB port for providing instructions and/or data for configuring one or more of the processors to manage power of the system and/or data for configuring one or more of the processors to manage loads of the system.

4. The system of claim **2** wherein the storage media is further encoded with operating options instructions that when executed by one or more of the processors causes the system to receive operating options data over the I/O port, the operating options data when interpreted by one of the processors executing the operating options instructions causes the system so make available for user selection via the user control panel a subset of available system operating options, the subset of system operating options corresponding so the operating options data.

5. The system of claim **2** further comprising tangible computer readable media encoded with computer executable user-configurable instructions, said user-configurable instructions executable by the external computer to provide monitoring instructions to one or more of the processors via the I/O port, said monitoring instructions causing the system to monitor a system setting, detect when the system setting is outside a reference range and provide a warning indication via the user control panel when the system setting is outside the reference range.

6. The system of claim **1** wherein the storage media is further encoded with diagnostic instructions that when executed by one or more of the processors causes the system to monitor for one or more system faults from a set of system faults comprising

a configuration failure wherein the system fails to successfully load preselected configuration data at system power up and wherein in response to said configuration failure the system implements a default configuration;

a communication failure involving one or more of the processors wherein in response to said communication failure the user control panel provides a communication failure indication; and

a power failure wherein in response to said power failure the user control panel provides a power failure indication.

7. The system of claim **1** wherein the storage media is further encoded with load management instructions that when executed by one or more of the processors causes the system to monitor system input voltage from a vehicle battery, detect when the system input voltage is outside a system input voltage reference range and provide a warning indication via the user control panel when the system input voltage is outside the system input voltage reference range.

8. The system of claim **7** wherein the system input voltage reference range is selectable via the user control panel.

9. The system of claim **7** wherein said monitoring instructions comprise load management instructions that when executed by one or more of the processors causes the system to monitor system input voltage from a vehicle battery, detect when the system input voltage is outside a system input voltage reference range and provide a warning indication via the user control panel when the system input voltage is outside the system input voltage reference range.

10. The system of claim **9** wherein the system input voltage reference range is selectable via the user-configurable instructions.

11. The system of claim **2** wherein one or more of the processors is programmed to reset a PTT function after a preset period of time elapses after a PTT push-button is continuously engaged to activate the PTT function for providing audio via a speaker to prevent the PTT function from remaining activated beyond the preset period.

12. The system of claim **2** further comprising at least one of the following:

wherein one or more of the processors is programmed to implement a configurable power manager function or a configurable load manager function;

wherein one or more of the processors is programmed to implement monitoring voltages or currents of components and includes de-energizing a component having a monitored voltage or a monitored current outside a preset range; and

wherein at least one of the processors is programmed to monitor a power supply voltage level and recognize dropout voltage groups selectable by a use and wherein in response to the monitored voltage level falling below a specified voltage level for a selected dropout voltage group, the processor is programmed to cause the selected dropout voltage group to become de-energized.

13. The system of claim **12** wherein the preset range and the specified voltage level are each selectable by the user via a USB port connected to one or more of the processors and wherein a delay period must elapse before a group is de-energized.

14. The system of claim **2** wherein one or more of the processors is programmed to implement a load manager function and a configurable delayed shutoff function wherein the load manager when activated controls the power to other equipment in the vehicle through an external solenoid and wherein the configurable delayed shutoff function when activated includes a sleep delay timer such that the system remains active after the vehicle ignition is turned off for the duration of the sleep delay timer.

15. A system for controlling the use of an emergency warning light and for controlling the use of a siren in a motorized vehicle, said system comprising:

a user control panel for receiving user input and for displaying system status;

one or more processors for controlling operation of the system in response to received user input and for providing system status for display; and

storage media encoded with system instructions for execution by one or more of the processors for controlling the actuation of and the pattern provided through the emergency warning light and for controlling the actuation of and the audible sounds generated by the siren;

wherein one or more of the processors is programmed to reset a PTT function after a preset period of time elapses after a PTT push-button is continuously engaged to activate the PTT function for providing audio via a speaker to prevent the PTT function from remaining activated beyond the preset period.

16. A system for controlling the use of an emergency warning light and for controlling the use of a siren in a motorized vehicle, said system comprising:

a user control panel for receiving user input and for displaying system status;

one or more processors for controlling operation of the system in response to received user input and for providing system status for display; and

storage media encoded with system instructions for execution by one or more of the processors for controlling the actuation of and the pattern provided through the emergency warning light and for controlling the actuation of and the audible sounds generated by the siren;

wherein at least one of the following:

one or more of the processors is programmed to implement a configurable power manager function or a configurable load manager function;

one or more of the processors is programmed to monitor voltages or currents of components and includes de-energizing a component having a monitored voltage or a monitored current outside a preset range; and

one or more of the processors is programmed to monitor a power supply voltage level and recognize dropout voltage groups selectable by a user and wherein in response so the monitored voltage level falling below a specified voltage level for a selected dropout voltage group, the processor is programmed to cause the selected dropout voltage group to become de-energized.

17. The system of claim **16** wherein the preset range and the specified voltage level are each selectable by a user via a USB port connected to one or more of the processors and wherein a delay period must elapse before a group is de-energized.

18. A system for controlling the use of an emergency warning light and for controlling the use of a siren in a motorized vehicle, said system comprising:

a user control panel for receiving user input and for displaying system status;

one or more processors for controlling operation of the system in response to received user input and for providing system status for display; and

storage media encoded with system instructions for execution by one or more of the processors for controlling the actuation of and the pattern provided through the emergency warning light and for controlling the actuation of and the audible sounds generated by the siren;

wherein one or more of the processors is programmed to implement a load manager function and a configurable delayed shutoff function wherein the load manager when activated controls the power to other equipment in the vehicle through an external solenoid and wherein the configurable delayed shutoff function when activated includes a sleep delay timer such that the system remains active after the vehicle ignition is turned off for the duration of the sleep delay timer.

* * * * *